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FROM

Princeton University Library

KEY

TO

DAVIES' ARITHMETIC.

FOR THE USE OF TEACHERS ONLY.

NEW YORK:
PUBLISHED BY A. S. BARNES & CO.,
No. 51 JOHN-STREET.
1847.

Educ T 118.47.317

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PREFACE.

THIS Key to Davies' Arithmetic is designed only for Teachers, the pupil should not be permitted to use it. It was not intended as a means of aiding the teachers in working the examples, but to assist them in teaching the subject of Arithmetic. Every competent teacher is of course able to work any example in an Arithmetic, but has not always time to do so in the school-room. The Key is intended to aid the teacher in his labors, by presenting to him every example in the Arithmetic fully wrought out and carefully set down.

If, therefore, a pupil makes a mistake in working an example, the teacher, by comparing his slate with the Key, can at once detect the error without the trouble of working the example from the beginning.

The large figures at the top of each page show the corresponding page of the Arithmetic, and the large figure over each example points out the number of the example in the Arithmetic.

NEW YORK, 1847.

KEY.

NOTATION.

EXAMPLES IN WRITING THE ORDERS OF UNITS.

(3) *Ans.* 9.
(4) *Ans.* 8654.
(6) *Ans.* 154970.
(7) *Ans.* 40000000000.
(9) *Ans.* 6045.
(10) *Ans.* 1600800040071.
(11) *Ans.* 706000989.
(12) *Ans.* 60940201.
(13) *Ans.* 1409060760503.
(14) *Ans.* 13800769703009.
(15) *Ans.* 907400832106000201.

EXAMPLES IN EXPRESSING NUMBERS BY FIGURES.

(2) *Ans.* 40.
(4) *Ans.* 4,000.
(6) *Ans.* 400,000.
(9) *Ans.* 6,021.
(10) *Ans.* 2,040.
(11) *Ans.* 105,007.
(12) Ans. 3,000,000,000.

(13) *Ans.* 95,000,000,000,000,000.
(14) *Ans.* 106,000,000,004,002.
(15) *Ans.* 59,059,059,064,959.
(16) *Ans.* 12,111.
(17) *Ans.* 9,000,000,065.
(18) *Ans.* 304,000,001,321,941.
(19) *Ans.* 9,640,706,080,213.
(20) *Ans.* 305,104,001,045,074.
(21) *Ans.* 80,301,006,004,620.
(22) *Ans.* 405,904,400,700,060,606.

ROMAN TABLE.—EXAMPLES.

(1) *Ans.* MDCCCXLVII.
(2) *Ans.* 1800.
(3) *Ans.* MMDCLXXV.
(5) *Ans.* 3704.

ADDITION OF SIMPLE NUMBERS.

(4)	(5)	(6)
Ans. 787676921	*A.* 100570011	*A.* 15371781930

	(7)	(8)	(9)	(10)
	8685	246034	27104	1
	2194	298765	32547	37
	7421	47321	10758	39504
	5063	58653	6256	6790312
	2196	64218	704321	18757421
	1245	5376	730491	265
Ans.	26754	9821	2787316	*A.* 25587540
		340	2749104	
	Ans.	730528	*A.* 7047897	

(11)	(12)	(13)
562163	75	58982487654
21964	1095	740350540760
56321	6435	425703402603
18536	267000	34020040020
4340	1455	560800700500
279	27000018	*Ans.* 1819857171537
83	270027000	
Ans. 663686	*Ans.* 297303078	

APPLICATIONS.

(1)	(2)	(3)	(4)	(5)
31	960	60	267	1800
28	725	150	325	2500
31	830	240	*Ans.* 592	600
30	798	100		7500
31	698	*Ans.* 550 *dolls.*		1325
30	569			1325
31	987			1325
31	*Ans.* 5567		*Ans.*	16375
30				
31				
30				
31				
Ans. 365				

(6)

	horses.	*cows.*	*oxen.*	*colts.*	*calves.*	*young cattle.*	*sheep.*
No. 1,	5	14	8	6			
No. 2,	3	6		4	20	12	
No. 4,				2	16	5	320
	8	20	8	12	36	17	320

$8+20+8+12+36+17+320=421$ Ans.

(7)	(8)	(9)	(10)
125	763	4550	4638
267	4663	247000	216
Ans. 392	37	936	8329
	49763	7000700	1212
	6178	*Ans.* 7253186	*Ans.* 14395
	671		
	Ans. 62075		

(11)	(12)	(13)	(14)
5221	6214	7420	3750
7540	2403	612	216
1638	590	2541	8481
5648	8732	9103	275
7300	1217	430	8610
Ans. 27347	2464	1000	2541
	Ans. 21620	*Ans.* 21106	*Ans.* 23873

(15)	(16)	(17)	(18)
423	5674	1728	60
315	2004	26510	3600
531	8601	35	46400
414	3430	100	604800
612	47	3261	2419200
234	1101	9	31557600
621	7	245	*Ans.* 34631660
414	24651	16408	
711	90	6733	
144	314	40000	
621	*Ans.* 45919	*Ans.* 95029	
918			
Ans. 5958			

(19)	(20)	(21)	(22)
3912	11260555	4000	1795
1856	717103	570	85
2011	2092014	99	*A.* 1880
4540	6846949	54	
937	310000	273	
6338	40981	69073	
3603	20827	4000	
1586	2860	61998	
2044	2614	752	
2951	*A.* 21293903	*A.* 140819	
4228			
1345			
1011			
6138			
960	(23)	(24)	(25)
607	24031	2000000	61297
5150	1320	531000	100038
13886	40214	120	289163
617	34314	14000	*A* 450498
7513	*Ans.* 99879	30024	
4079		560	
743		702	
612		*Ans.* 2576406	
2519			
1238			
2445			
ns. 82869			

(26)	(27)	(28)	(29)
4000	144	6243	999
4006	90	4123	200
3093	98	9401	Each son's *Ans.* 1199
1224	38	130	999
1400	*A.* 370	*A.* 19897	1199
200			1199
us. 13923			1199
			Total 4596

(30)

	243
	5021
	7628
	9207
	64
	5823
	742
	796
	5009
	325
	7426
	31186
	987
	6954
	2748
Ans.	84159

(32)

	549005
	336461
	152156
	142548
	32292
	75000
Ans.	1287462

(33)

	700000
	700000
	1200000
	3000000
	2600000
	360000
	40000
	700000
	500000
	240000
	150000
Ans.	*10190000*

(31)

	4658218
	12564478
	25167833
1st 3 yrs.	42390529

	2236889
	1164796
	1129217
last 3 yrs.	4530902

(34)

Maine,	501,793
New Hampshire,	284,574
Vermont,	291,948
Massachusetts,	737,699
Rhode Island,	108,830
Connecticut,	309,978
New York,	2,428,921
New Jersey,	373,306
Pennsylvania,	1,724,033
Delaware,	78,085
Maryland,	469,232
Virginia,	1,239,797
North Carolina,	753,419
South Carolina,	594,398
Georgia,	691,392
Alabama,	590,756
Mississippi,	375,651
Louisiana,	352,411
Tennessee,	829,210
Kentucky,	779,828
Ohio,	1,519,467
Indiana,	685,866
Illinois,	476,183
Missouri,	383,702
Arkansas,	97,574
Michigan,	212,267
Florida,	54,477
Wisconsin Territory,	30,945
Iowa Territory,	43,112
District of Columbia,	43,712
Naval Service,	6,100
Ans.	17,068,666

SUBTRACTION OF SIMPLE NUMBERS.

(9)		(10)	
	2637804		3762162
	2376982		826541
Ans.	260822	*Ans.*	2935621

(11)		(12)	
	78213609		30097
	27821890		1654
Ans.	50391719	*Ans.*	28443

(13)		(14)	
	100247000		1000000
	1000409		1
Ans.	99246591	*Ans.*	999999

APPLICATIONS.

(1)		(2)		(3)	
	1825		1830		1565
	1815		1785		450
Ans.	10 *years.*	*Ans.*	45	*Ans.*	1115

(4)		(5)		(6)	
100	1000		1847		1799
314	766		1492		1732
143	*Ans.* 234	*Ans.*	355	*Ans.*	67
209					
766					

(7)		(8)		(9)	
	1838		14,189,108		2,428,921
	1776		2,873,458		1,724,033
Ans.	62	*Ans.*	11,315,650	Ans.	704,888

(10)

1812
1775
Ans. 37

(11)

312,710
258,037
Ans. 54,673

(12)

1200
504
Ans. 696

(13)

150 3090
253 403
403 *Ans.* 2687

(14)

500 3500
250 2000
Ans. 250 1500

(15)

1847
1755
Ans. 92

(16)

1781
1755
Ans. 26

(17)

4338472
2477667
Ans. 1860805

(18)

1839
1616
Ans. 223

(19)

1847
1609
Ans. 238

(20)

1776
17
Ans. 1759

(21)

1620
1565
Ans. 55

(22)

35720
9100
Ans. 26620

(23)

8150
1634
Ans. 6516

(24)

1492 to 1847
1302 1302
Ans. 190 *Ans.* 545

(25)

1853
1370
Ans. 483

(26)

705684
4261
Ans. 701423

27)

3473
1528
Ans. 6945

(28)

905106392
90462372
Ans. 814644020

(29)

1675 5025
335 1005
Ans. 1340 4020

APPLICATIONS IN ADDITION AND SUBTRACTION.

(1)

19576	1050	47531
27580	6974	18486
375	10462	*Ans.* 29045
47531	18486	

(2)

855	1395
637	977
403	*Ans.* 418
1395	

(3)

504	2543
600	1829
725	*Ans.* 714
1829	

(4)

275	10000
220	4205
35	*Ans.* 5795
3675	
4205	

(5)

300	125	580
95	25	190
60	40	*Ans.* 390
125	190	
580		

(6)

350	3456
456	1481
675	*Ans.* 1975
1481	

(7)

1240	12000
1346	7045
2012	*Ans.* 4955
2101	
346	
7045	

(8)

10000	
44	
Ans. 9956	

(9)

2027402	
1551857	
A. 475545	

(10)

450000000	805000000
233500000	748000000
46500000	*A.* 57000000
18000000	
748000000	

(11)

34568
12456
2467
41210
90701
41665
Ans. 49036

2365
39300
41665

(12)

350000
225100
4000
96000
675100
450120
Ans. 224980

(13)

365
721
1086

1200
1086
Ans. 114

2100
3200
1600
1200
8100

(14)

10000
8100
Ans. 1900

(15)

269
467
879
146
1761

3467
1761
Ans. 1706

(16)

423
912
1335

367
875
1012
2254
1335
Ans. 919

(17)

39246
2406
Ans. 41652

(18)

36
200
150
386

386
331
Ans. 55

(19)

28675
1231
29906
1683
Ans. 28223

(20)

31769000
14731000
46500000

233500000
46500000
Ans. 187000000

(21)

489 125 . . . 186 912
259 134 . . . 199 385

230 *left.* 259 385 527 *cost.*

MULTIPLICATION OF SIMPLE NUMBERS.

CASE I.

(2) *Ans.* 557808

(3) *Ans.* 2036223

(6) *Ans.* 745182

(7) *Ans.* 74679

(9) *Ans.* 423815

(10) *Ans.* 737506

(11) *Ans.* 4233258

(12) *Ans.* 1891040

(13) *Ans.* 936 *cents.*

(14) *A.* 1236 *dollars.*

(15) *A.* 298 *dollars.*

CASE II.

(2)
37864
209
340776
75728
Ans. 7913576

(3)
34293
74
137172
240051
Ans. 2537682

(4)
47042
91
47042
423378
Ans. 4280822

(5)
46834
406
281004
187336
Ans. 19014604

(6)
679084
126
4074504
1358168
679084
Ans. 85564584

(7)
1098731
1987
7691117
8789848
9888579
1098731
Ans. 2183178497

(8)
8971432
10471
8971432
62800024
35885728
8971432
Ans. 93939364472

(9)

12345678
32
24691356
37037034
Ans. 395061696

(10)

9378964
42
18757928
37515856
Ans. 393916488

(11)

1345894
49
12113046
5383576
Ans. 65948806

(12)

576784
64
2307136
3460704
Ans. 36914176

(13)

596875
144
2387500
2387500
596875
Ans. 85950000

(14)

46123101
72
92246202
322861707
Ans. 3320863272

(15)

61835720
132
123671440
185507160
61835720
Ans. 8162315040

(16)

718328
96
4309968
6464952
Ans. 68959488

(17)

7128368
1440
0000000
28513472
28513472
7128368
Ans. *10264849920*

(18)

6795634
918546
40773804
27182536
33978170
54365072
6795634
61160706
Ans. 6242102428164

(19)

86972
1208
695776
173944
86972
Ans. 105062176

(20)

1055054
570
73853780
5275270
Ans. 601380780

(21)

538362
9258
4306896
2691810
1076724
4845258
Ans. 4984155396

(22)

50406
8050
2520300
403248
Ans. 405768300

(23)

523972
15276
3143832
3667804
1047944
2619860
523972
Ans. 8004196272

(24)

760184
16150
38009200
760184
4561104
760184
Ans. 12276971600

(25)

1055070
31456
6330420
5275350
4220280
1055070
3165210
Ans. 33188281920

(26)

91874163
27498765
459370815
551244978
643119141
734993304
826867467
367496652
643119141
183748326
Ans. 2526426017908695

(27)

86543291213456
12637482965
432716456067280
519259747280736
778889620921104
173086582426912
692346329707648
346173164853824
605803038494192
259629873640368
519259747280736
173086582426912
86543291213456

Ans. 1093689368445084378777040

CASE III.

(2)	(3)	(4)
5709	342516	209402
8	7	9
45672	2397612	1884618
6	8	8
Ans. 274032	*Ans.* 19180896	*Ans.* 15076944

(5)	(6)	(7)
937387	91738	3842
9	9	12
8436483	825642	46104
6	9	12
50618898	*Ans.* 7430778	Ans. 553248

CASE V.

(1)

76400
24
3056
1528
Ans. 1833600

(2)

7532000
580
60256
37660
Ans. 4368560000

(3)

416000
357000
2912
2080
1248
Ans. 148512000000

(4)

4871000
270000
34097
9742
Ans. 1315170000000

(5)

296200
875000
14810
20734
23696
Ans. 259175000000

(6)

3456789
567090
31111101
24197523
20740734
17283945
Ans. 1960310474010

(7)

21200
70
Ans. 1484000

(8)

359260
304000
143704
107778
Ans. 109215040000

(9)

7496430
695000
3748215
6746787
4497858
A. 5210018850000

APPLICATIONS.

(1)

	48
	10
Ans.	480

(2)

	37	49	
	20	75	
	740	245	
		343	
		3675	

	3675
	740
Ans.	4415

(3)

	24
	7
Ans.	168

(4)

	97	9	12
	3	3	3
Ans.	291	27	36

(5)

	15	60	123
	4	36	18
	60	27	984
		123	123
Ans.			2214

(6)

	365
	32
	730
	1095
Ans.	11680

(7)

	49
	63
	147
	294
Ans.	3087

(8)

	3751
	5
Ans.	18755

(9)

	1128
	106
	6768
	1128
Ans.	119568

(10)

	1252
	786
	7512
	10016
	8764
Ans.	984072

(11)

	814
	30009
	7326
	2442
Ans.	24427326

(12)

	375296321
	79024
	1501185284
	750592642
	3377666889
	2627074247
	29657416470704

(13)

	2730
	8
Ans.	21840

(14)

123456789
987654321
123456789
246913578
370370367
493827156
617283945
740740734
864197523
987654312
1111111101

Ans. 121932631112635269

(15)

397
7

Ans. 2779

(16)

569
74
2276
3983

Ans. 42106

(17)

576
169
5184
3456
576

Ans. 97344

(18)

687
73
2061
4809

Ans. 50151

(19)

365
74
1460
2555

Ans. 27010

(20)

699
14
2796
699

Ans. 9786

(21)

6176777
22222
12353554
12353554
12353554
12353554
12353554

Ans. 137260338494

(22)

616783
36
3700698
1850349

Ans. 22204188

(23)

1092
320
21840
3276

Ans. 349440

(24)

46000
84
184
138

Ans. 1564000

(25)

470
45
235
188
21150
50

Ans. 1057500

(26)

250
30
7500
20

Ans. 150000

(27)

125
350
625
375
43750
3000

Ans. 131250000

BILLS OF PARCELS.

4 Chests of tea, 45*lb.* each, at 1 dollar per *lb.*, -	180
3 Firkins of butter at 17 dollars per firkin, - -	51
4 Boxes of raisins at 3 dollars per box, - - -	12
36 Bags of coffee at 16 dollars each, - - - -	576
14 Hogsheads of molasses at 28 dollars each, -	392
Ans.	$1211

27 Bags of coffee at 14 dollars per bag, - - -	378
18 Chests of tea at 25 dollars per chest, - - -	450
75 Barrels of shad at 9 dollars per barrel, - -	675
87 barrels of mackerel at 8 dollars per barrel, -	696
67 Cheeses at 2 dollars each, - - - - - - -	134
59 Hogsheads of molasses at 29 dollars per *hhd.*,	1711
Ans.	$4044

DIVISION OF SIMPLE NUMBERS.

CASE I.

(2) *Ans.* 500802

(4) *Ans.* $2403487\frac{2}{3}$

(5) *Ans.* $74909969\frac{3}{9}$

(6) *Ans.* $127724292\frac{2}{11}$

(7) *Ans.* $13957027\frac{5}{12}$

(8) *Ans.* $2747804\frac{1}{10}$

(9) *Ans.* 712499166

(10)
3)6794108
Ans. $2264702\frac{2}{3}$

(11)
9)21090431
Ans. $2343381\frac{2}{9}$

(12)
6)2345678964
Ans. *390946494*

(13)
12)570196382
Ans. $47516365\frac{2}{12}$

(14)

9)67897634

Ans. $7544181\frac{5}{9}$

(15)

12)75436298

Ans. $6286358\frac{2}{12}$

PROOF OF MULTIPLICATION.

(3)

270000)1315170000000(4871000
1080000
2351700
2160000
1917000
1890000
270000
270000
000

(2)

61835720)8162315040(132
61835720
197874304
185507160
123671440
123671440

(4)

96)68959488(718328
672
175
96
799
768
314
288
268
192
768
768

(5)

1440)10264849920(7128368
10080
1848
1440
4084
2880
12049
11520
5299
4320
9792
8640
11520
11520

(6)

```
6795634)6242102428164(918546
        61160706
        12603182
         6795634
        58075488
        54365072
         37104161
         33978170
          31259916
          27182536
           40773804
           40773804
           00000000
```

EXAMPLES IN DIVISION.

(1)

```
37)7210473(194877
   37
   351
   333
    180
    148
     324
     296
      287
      259
       283
       259
        24 rem.
```

(2)

```
45)147735(3283
   135
    127
     90
     373
     360
      135
      135
      000
```

(3)

```
54)937387(17359
   54
   397
   378
    193
    162
     318
     270
      487
      486
        1 rem.
```

(4)

```
108)145260(1345
   108
   372
   324
   486
   432
   540
   540
   000
```

(5)

```
238)79165238(332627
   714
   776
   714
   625
   476
  1492
  1428
   643
   476
  1678
  1666
    12 rem.
```

(6)

```
7803)52015735(7947
    54621
    73947
    70227
    37203
    31212
    59915
    54621
     5294 rem.
```

(7)

```
949998)74855092410(78795
     6649986
     8355232
     7599984
     7552484
     6649986
     9024981
     8549982
     4749990
     4749990
```

(8)

```
4674)47254149(10110
    4674
    5141
    4674
    4674
    4674
    00009 rem.
```

(9)

```
38473)119184669(3097
    115419
     376566
     346257
     303099
     269311
      33788 rem.
```

(10)

912314)280208122081(307140
2736942
6513922
6386198
1277240
912314
3649268
3649256
121 *rem.*

(11)

8405)293839455936(34960078
25215
41689
33620
80694
75645
50495
50430
65593
58835
67586
67240
346 *rem.*

(12)

57606)4637064283(80496
460848
285842
230424
554188
518454
357343
345636
11707 *rem.*

(13)

210472)352107193214(1672940
210472
1416351
1262832
1535199
1473304
618953
420944
1980092
1894248
858441
841888
165534 *rem.*

(14)

2708630425)5580011726061767 24(206008604
5417260850
16275087606
16251782550
23305056176
21669043400
16360127767
16251782550
10834521724
10834521700
24 *rem.*

(15)

57143)1714347149347(30001000
171429
57149
57143
6347 *rem.*

(16)

678957)6754371495671594(9948157977
6110613
6437584
6110613
3269719
2715828
5538915
5431656
1072596
678957
3936397
3394785
541612[illegible]
4752699
6634225
6110613
5236129
4752699
4834304
4752699
81605 *rem.*

(17)

57149)71900715708(1258127
57149
147517
114298
332191
285745
464465
457292
72737
57149
150880
114298
415828
400043
15785 *rem.*

(18)

```
37149)571943007145(15395919
      37149
      ------
      200453
      185745
      ------
       147080
       111447
       ------
        356330
        334341
        ------
         219897
         185745
         ------
          341521
          334341
          ------
            71804
            37149
            ------
            346555
            334341
            ------
             12214 rem.
```

(19)

```
47143)671493471549375(14243757748
      47143
      ------
      200063
      188572
      ------
       114914
        94286
        ------
         206287
         188572
         ------
          177151
          141429
          ------
           357225
           330001
           ------
            272244
            235715
            ------
             365299
             330001
             ------
              352983
              330001
              ------
               229827
               188572
               ------
                412555
                377144
                ------
                 35411 rem.
```

(20)

987654321)121932631112635269(123456789
987654321
2316719901
1975308642
3414112592
2962962963
4511496296
3950617284
5608790123
4938271605
6705185185
5925925926
7792592592
6913580247
8790123456
7901234568
8888888889
8888888889

(21)

37149)571943007645(15395946
37149
200453
185745
147080
111447
356330
334341
219897
185745
341526
334341
71854
48596
232585
222894
9691 rem.

(22)

57007)171493715947143(3008292243
171021
472715
456056
166599
114014
525854
513063
127917
114014
139031
114014
250174
228028
221463
171021
50442 *rem.*

CONTRACTIONS IN DIVISION.

CASE I.

(2)
4)18576
12)4644
Ans. 387

(3)
9)9576
8)1064
Ans. 133

(4)
12)19296
8)1608
Ans. 201

(5)
4)55728
9)13932
4)1548
Ans. 387

(6)
2)92880
2)46440
3)23220
2)7740
2)3870
Ans. 1935

(7)

4)57888
2)14472
2)7236
2)3618
Ans. 1809

(8)

3)154368
2)51456
2)25728
Ans. 12864

ART. 44.

(2)

7)956789
8)136684 . . . 1
17085 . . . 4
Ans. $17085\frac{29}{56}$.

(3)

8)4870029
9)608753 . . . 5
67639 . . . 2
Ans. $67639\frac{21}{72}$.

(4)

10)674201
11)67420 . . . 1
6129 . . . 1
Ans. $6129\frac{11}{110}$.

(5)

12)445767
12)37147 . . . 3
3095 . . . 7
Ans. $3095\frac{87}{144}$.

(6)

7)1913578
2)273368 . . . 2
2)136684
2)68342
34171
Ans. $34171\frac{2}{56}$.

(7)

3)14610087
3)4870029
2)1623343
2)811671 . . . 1 - - 3×3×1 = 9
2)405835 . . . 1 - - 3×3×2×1 = 18
202917 . . . 1 - - 3×3×2×2×1 = 36
Ans. $202917\frac{63}{72}$. Remainder = 63

(8)

5)2696804
2)539360 . . . 4 - - = 4
11)269680
24516 . . . 4 - - 5×2×4=40
Ans. $24516\frac{44}{110}$ Rem. =44

(9)

3)936496
4)312165 . . . 1 - - = 1
2)78041 . . . 1 - - 3×1 = 3
5)39020 . . . 1 - - 3×4×1 = 12
6)7804
1300 . . . 4 - - 3×4×2×5×4=480
Ans. $1300\frac{496}{720}$ Rem. =496

CASE III.

(2)

21|0000)98|6327(4
84
14
Ans. $4\frac{146327}{210000}$

(3)

6|000)876|000
146
Ans. 146

(4)

4007|00)365995|03(91
36063
5365
4007
1358
Ans. $91\frac{1358}{400700}$

(5)

365|00)5714364900|75(15655794
365
2064
1825
2393
2190
2036
1825
2114
1825
2899
2555
3440
3285
1550
1460
90

Ans. $15655794\frac{9075}{36500}$.

(6)

73|000)194718490|700(2667376
146
487
438
491
438
538
511
274
219
559
511
480
438
42

Ans. $2667376\frac{42700}{73000}$.

(7)

315|00)14950708071|49(47462565
1260
2350
2205
1457
1260
1970
1890
808
630
1780
1575
2057
1890
1671
1575
96

Ans. $47462565\frac{9649}{31500}$.

(8)

1749|000)7149374947194|715(4087692937
6996
15337
13992
13454
12243
12119
10494
16254
15741
5137
3498
16391
15741
6509
5247
12624
12243
381

Ans. $4087692937\frac{381715}{1749000}$.

APPLICATIONS IN DIVISION.

(2)

4)10000

Ans. 2500

(3)

5)4500

Ans. 900

(4)

24)1560(65

144

120

120

Ans. 65

(5)

124)40796(329

372

359

248

1116

1116

Ans. 329

(6)

24)1416(59

120

216

216

Ans. 59

(7)

425)19125(45

1700

2125

2125

Ans. 45

(8)

26)16890320(649627

156

129

104

250

234

163

156

72

52

200

182

18

Ans. $649627\frac{18}{26}$

(9)

365)12775(35

1095

1825

1825

Ans. 35

(10)

2)1250

Ans. 625

(11)

8)95000000

Ans. 11875000

(12)

5)312710

Ans. 62542

(13)

60)5100(85

480

300

300

Ans. 85

(14)

36)288(8

288

Ans. 8

(15)

7)365

Ans. $52\frac{1}{7}$

(16)

24)2040(85
192
120
120
Ans. 85

(17)

23)92(4
92
Ans. 4

(18)

16)223360(13960
16
63
48
153
144
96
96
0
Ans. 13960

(19)

16|0)217248|0(13578
16
57
48
92
80
124
112
128
128
Ans. 13578

(20)

94)6716394(71451
658
136
94
423
376
479
470
94
94
Ans. 71451

(21)

145)10875(75
1015
725
725
Ans. 75

(22)

47)1222(26
94
282
282
Ans. 26

(23)

987)351372(356
2961
5527
4935
5922
5922
Ans. 356

(24)

3942)21587211936(5476208
19710
18772
15768
30041
27594
24471
23652
8199
7884
31536
31536
Ans. 5476208

(25)

142)48564(342
426
596
568
284
284
Ans. 342 *days.*

(26)

236)887124(3759
708
1791
1652
1392
1180
2124
2124
Ans. 3759

(27)

7)1491
Ans. 213

(28)

62|0)7440|0(120
62
124
124
0
Ans. 120

(29)

6|0)29520|0
Ans. 4920

(30)

44)17028(387
132
382
352
308
308
Ans. 387

(31)

718828)68959488(96
6464952
4309968
4309968
Ans. 96

(32)

47)34310(730
329
141
141
0
Ans. 730

(33)

90001)761858465(8465
720008
418504
360004
585006
540006
450005
450005
Ans. 8465

(34)

8465)761858465(90001
76185
8465
8465
Ans. 90001

(35)

912)1893312(2076
1824
6931
6384
5472
5472
Ans. 2076

(36)

61)28609(469
244
420
366
549
549
Ans. 469

(37)

472)251104(532
2360
1510
1416
944
944
Ans. 532

(38)

27856)26537009535(952649
250704
146660
139280
73809
55712 *Ans.* $952649\frac{18991}{27856}$
180975
167136
138393
111424
269695
250704
18991

APPLICATIONS IN THE PRECEDING RULES.

(1)

90	25	9	65	90
	3	4	3	75
	75	36	195	36
				195
			Ans.	396

(2)

365
221
Ans. 144

(3)

95
327
Ans. 422

(4)

12	80	65	128
4	48	40	105
48	128	105	*Ans.* 23

(5)

14	40	56	176
4	3	120	150
56	120	176	*Ans.* He loses 26

(6)

615)51679680(84032
4920
2479
2460
1968
1845
1230
1230
Ans. 84032

(7)

67941
30620
1358820
407646
203823
Ans. 2080353420

(8)

37)1213193(32789
111
103
74
291
259
329
296
333
333
Ans. 32789

(9)

65)455(7
455
Ans. 7

(10)

6
4
24
6
2
Ans. 32

(11)

35)25000(714$\frac{10}{35}$
245
50
35
150
140
10
Ans. 714$\frac{10}{35}$

(12)

68000
24
272000
136000
1632000
Ans. { 1632000 *in a day*
595680000 *in a year.*

1632000
365
8160000
9792000
4896000
595680000

(13)

50
60
3000

18050
3000
50)15050(301
150
50
50

301
50
Ans. 351

(14)

3456)3411072(987
31104
30067
27648
24192
24192
Ans. 987

(15)

1974)175686(89
15792
17766
17766
Ans. 89

(16)

6)48565406
Ans. $8094234\frac{2}{6}$

(17)

14000
1800
112
14
Ans. 25200000

(18)

7912
112
15824
7912
7912
886144
7912
878232
Ans. { 886144 / 878232

(19)

12
40
480
25
240
96
12000

12|000)45000|000
3750
Ans. 3750 *days.*

(20)

12|000)60000|000
5000

Ans. 5000 *days.*

(21)

292
365
1460
1752
876
106580
67760

Ans. 38820 *dollars.*

(22)

365)31173(85
2920
1973
1825
148

Ans. $85\frac{148}{365}$

(23)

365 2698
6 2190
2190

Ans. 508 *dollars.*

(24)

3708871)233884800(63
22253226
11352540
11126613
225927

(25)

3173)119989(37
9519
24799
22211
2588

ADDITION OF FEDERAL MONEY.

(1)

Ans. $88,57 5.

(2)

Ans. $252,32 1.

(5)

Ans. $388,29 2.

(6)

Ans. $53,70 0.

APPLICATIONS.

(1)	(2)	(3)
$ cts. m.	$ cts. m.	$ cts. m.
6, 89 0	30, 00 4	630, 49 0
25, 04 3	104, 60 1	25, 00 0
1, 12 5	85, 00 9	00, 87 5
40, 37 8	*Ans.* 219, 61 4	00, 00 4
Ans. 73, 43 6		*Ans.* 656, 36 9

(4)	(5)	(6)
$ cts. m.	$ cts. m.	$ cts. m.
00, 28 0	1, 12 5	0, 57 0
00, 78 0	0, 75 6	0, 37 5
12, 06 3	0, 26 9	3, 37 5
8, 01 1	0, 27 0	9, 87 5
1, 20 0	2, 65 7	0, 12 5
Ans. 22, 33 4	2, 87 5	0, 08 5
	Ans. 7, 95 2	*Ans.* 14, 40 5

SUBTRACTION OF FEDERAL MONEY.

(6)

$ cts. m.	$ cts. m.	$ cts. m.	$ cts. m.
6, 00 0	9, 75 0	0, 75 0	87, 35 4
1	8	6	9
Ans. 5, 99 9	*A.* 9, 74 2	*A.* 0, 74 4	*A.* 87, 34 5

(7)

$107, 00 3
47 9
Ans. 106, 52 4

APPLICATIONS.

(1)	(2)	(3)
$ cts.	$ cts. m.	$ cts.
3000, 00	78, 00 0	100, 00
187, 50	26, 00 3	97, 50
Ans. 2812, 50	*Ans.* 51, 99 7	*Ans.* 2, 50

(4)

$1005, 40 0
60, 03 9
Ans. 945, 36 1

(5)

$3005, 00 0
98, 03 9
Ans. 2906, 96 1

(6)

$100, 00 0
75, 37 5
Ans. 24, 62 5

(7)

$100
87,57
Ans. 12,43

(8)

$100
40,17 3
Ans. 59,82 7

(9)

$450
106,32 5
Ans. 343,67 5

MULTIPLICATION OF FEDERAL MONEY.

(1)

Ans. $3082,25 6.

(2)

Ans. $4282,83.

(3)

Ans. $36,04 8.

(5)

Ans. $491,95 2.

(6)

Ans. $963,30 3.

(7)

Ans. $4970,43.

(8)

Ans. $1895,07 6.

APPLICATIONS.

(1)

55
37
385
165
An 20,35

(2)

300
125
Ans. $375,00

(4)

25 5
90
Ans. $22,95 0

(5)

$2,75
29
2475
550
Ans. $79,75

)2 6,5
2

(6)

0,37 5
95
1875
375
rem. ,62 5

(7)

$3,25
300
Ans. $975,00

(8)

9704
,035
48520
29112
Ans. $339,64 0

(9)

356
3,25
1780
712
1068
Ans. $1157,00

(10)

$1,75
47
1225
700
Ans. $82,25

(11

4,37
Ans. $26,25

(12)

450
25
225
90
Ans. $11,25 0

(13)

685
307
4795
2055
Ans. $210,29 5

DIVISION OF FEDERAL MONEY.

(3)

16)56,17 0(351
48
81
80
17
16
10
Ans. $3,51 1/16

(4)

129)495,70 4(3,84 2
387
1087
1032
550
516
344
258
86

(5)

200)1200(0,06
1200

(6)

600)40000(0,66
3600
4000
3600
400

(7)

51)857,00(
51
347
306
410
408
20

(8)

157)6578,950(41,904
628
298
157
1419
1413
650
628
22 *rem.*

(9)

125)248,540(1,988
125
1235
1125
1104
1000
1040
1000
40 *rem.*

(10)

33)100,00(3,030+
99
100
99
10 *rem.*

(11)

1728)120463,2000(69,7125
10368
16783
15552
12312
12096
2160
1728
4320
3456
8640
8640

APPLICATIONS.

(1)

72)252,00(3,50
216
360
360
0

(2)

26)600,00(23,07
52
80
78
200
182
18

(3)

4|0)1800|0
$450

(4)

5|0)3769,25|0
$75,385

(5)

```
725)18306,25(25,25
   1450
   3806
   3625
    1812
    1450
    3625
    3625
```

(6)

```
15)1000,00 0(66,66 €
   90
   100
   90
   100
   90
   100
   90
   100
   90
   10
```

(7)

```
5|00)1250|00
   $2,50
```

(8)

```
25)600(24
   50
   100
   100
```

(9)

```
1400)840,00(0,60
   8400
      0
```

(10)

```
$  cts.
262, 50
 52, 50
105)315, 00(3,00
   315
      00
```

Ans. $3,00.

APPLICATIONS IN THE FOUR PRECEDING RULES.

(1)

A yoke of oxen - - - - - - -		= $80,75
6 cows - - -	at $29 each	= 174,00
30 sheep - - -	at $2,50 "	= 75,00
1 colt - - - - - - - - - -		= 25,00
2 do. - - - -	at $30 each	= 60,00
	Ans.	$414,75

(2)

6 bales - - - 20 pieces each = 120 *pieces.*
120 pieces - - - 29 yards each = 3480 *yards.*

3480)15660,00(4,50
13920
17400
17400
0

Ans. { 3480 *yards.*
{ $4,50 *per yard.*

(3)

3)33000
11000

Ans. { $11000 *wife's portion.*
{ $5500 *each child's part.*

$33000
11000
4)22000
$5500

(4)

3 cows - - - - - at $25 each = $75,00
1 yoke of oxen - - - - - - - = 65,00
60)140,00
Ans. $2,33 3

(5)

126 pounds - - - - at 9*cts.* = $11,34
85 " - - - - 6*cts.* = 5,10
6 pairs - - - - 37*cts.* = 2,22
3 hams - - - - 150*cts.* = 4,50
Ans. $23,16

(6)

62
40
16)2480(155*lb.*
16
88
80
80
80

(7)

4 coats - - at $29,50 = 118,00
8 vests - - at $3,00 = 24,00
6 pantaloons at $12,00 = 72,00
Ans. $214,00

(8)

4,56
14
1824
456
63,84

6 reams at $3,50 = 21,00

Ans. $42,84

(9)

300 bushels	at $1,37½	=	412,50
500 "	at $0,29	=	145,00
1000 "	at $0,34	=	340,00
75 tons	at $16,00	=	1200,00
	Ans.		$2097,50

(10)

112*lb.* butter.
36 cows.
672
336
4032
185
20160
32256
4032
$745,92

36
5,50 expense.
180
180
$198,00

745,92
198,00
Ans. $547,92

(11)

20 horses	at $125	=	2500
20 "	at $119	=	2380
17 cows	at $24	=	40[illegible]
12 oxen	at $65	=	78[illegible]
30 sheep	at $3,50	=	10[illegible]
	Ans.		$61[illegible]

(12)

12 pounds of tea	- - -	at 85½*cts.*	=	$10,26
85 " brown sugar	-	at 9½*cts.*	=	8,07 5
64 " coffee	- - -	at 7½*cts.*	=	4,64
38 " loaf sugar	- -	at 12½*cts.*	=	4,75
		Ans.		$27,72 5

(13)

	475	$1,90	3800,00
	4	2000	380,00
Amount per head	$1,90	10)3800,00	4)3420,00
	Expenses	$380,00	855,00
			3
		Ans.	$2565,00

(14)

500 bushels wheat	- -	at $1,87½	= 937,50
300 " oats	- - -	at $0,37½	= 112,50
250 " corn	- - -	at $0,80	= 200,00
			$1250,00
65 tons of hay	- - -	at $18,00	= 1170,00
5 two-years old	- -	at $8,00	= 40,00
8 calves	- - - - -	at $5,00	= 40,00
10 sheep	- - - - -	at $2,00	= 20,00
1 colt	- - - - - - - - -		= 36,00
1 pair steers	- - - - - - - -		= 28,50
			$164,50

2)1250,00 grain.
625,00 - - - - 625,00

3)1170,00 hay.
390,00 - - - - 390,00

4)164,50 live stock.
41,12½ - - - - 41,12½

Ans. $1056,12½

BILLS OF PARCELS

16 pounds of tea - - - -	at $0,85 - -	13,60 0
27 " of coffee - - -	at $0,15½ - -	4,18 5
15 yards of linen - - - -	at $0,66 - -	9,90 0
	Ans.	$27,68 5

36 pounds of sugar - - -	at $0,9½ - -	3,42
3 *hhd.* molasses - - - -	at $0,27 *gal.* -	51,03
5 casks rice, 285*lb.* each -	at $0,5 *lb.* -	71,25
2 chests of tea, 86*lb.* each -	at $0,96 *lb.* -	165,12
	Ans.	$290,82

69 chests of tea - - -	at $55,65 - -	3839,85
126 bags coffee - - - -	at $12,50 - -	1575,00
167 boxes raisins - - -	at $2,75 - -	459,25
800 bags almonds - - -	at $18,50 - -	14800,00
9004 barrels shad - - -	at $7,50 - -	67530,00
60 barrels oil - - - - -	at $34,56 - -	2073,60
	Ans.	$90277,70

REDUCTION OF DENOMINATE NUMBERS.

CASE I.

(3)

£	*s.*	*d.*
1465	14	5
20		
29314		
12		
351773		
4		
Ans. 1407092		

(4)

£	*s.*	*d.*
45	12	10
20		
912		
12		
Ans. 10954		

(5)

guineas.
87
21
87
174
1827
12
21924
4
Ans. 87696

(6)

£ *s.* *d.*
145 16 11
20
2916
12
Ans. 35003

CASE II.

(2)

12)3658
3)304 . . . 10*in.*
Ans. 101*yd.* 1*ft.* 10*in.*

(3)

80
21
80
160
2|0)168|0
Ans. £84

(4)

4)1549
12)387 . . . 1
2|0)3|2 . . . 3
Ans. £1 12*s.* $3\frac{1}{4}$*d.*

(5)

12)1046
2|0)8|7 . . . 2
Ans. £4 7*s.* 2*d*

(6)

12)4704
21)392
Ans. £18 14*s.*

(7)

12)6169
2|0)51|4 . . . 1
Ans. £25 14*s.* 1*d.*

PROOF OF REDUCTION.

(2)

£	s.	d.	far.
31	8	9	3
20			
628			
12			
7545			
4			
Ans. 30183			

PROOF.

4)30183
12)7545 . . . 3
2|0)62|8 . . 9
31 . . . 8
Ans. £31 8*s.* 9*d.* 3*far.*

(3)

£	s.	d.	far.
87	14	8	2
20			
1574			
12			
21056			
4			
Ans. 84226			

PROOF.

4)84226
12)21056 . . . 2
2|0)175|4 . . 8
87 . . . 14
Ans. £87 14*s.* 8*d.* 2*far.*

(4)

£	s.	d.	far.
407	19	11	3
20			
8159			
12			
97919			
4			
Ans. 391679			

PROOF.

4)391679
12)97919 . . . 3
2|0)815|9 . . 11
407 . . . 19
Ans. £407 19*s.* 11*d.* 3*fa*

AVOIRDUPOIS WEIGHT.

(2)

T.	cwt.	qr.	lb.
27	17	29	21
20			
557			
4			
2257			
25			
11306			
4514			
56446			
16			
339676			
56446			
Ans. 904136			

(3)

T.	cwt.	qr.
94	19	1
20		
1899		
4		
Ans. 7597		

(5)

	dr.	
$16=4\times4$	4)108910592	
	4)27227648	
$16=4\times4$	4)6806912	
	4)1701728	
$25=5\times5$	5)425432	
	5)[illegible]86	. . . 2
	4)[illegible]017	. . . $1\times5+2=7lb.$
	2\|0)425\|4	. . . 1 *qr.*
	212	. . . 14cwt.
Ans.	212*T.* 14cwt. 1qr. 7lb.	

(6)

oz.

16=4×4 { 4)2998128
4)749532

25=5×5 { 5)187383
5)37476 . . . 3
4)7495 . . . 1×5+3=8*lb.*
2|0)187|3 . . . 3*qr.*
93 . . . 13*cwt.*

Ans. 93*T.* 13*cwt.* 3*qr.* 8*lb.*

TROY WEIGHT.

(2)

lb.	*oz.*	*pwt.*	*gr.*
25	9	0	20
12			
309			
20			
6180			
24			
24740			
12360			
148340			

Ans.

(4)

gr.

24)678618
2|0)2827|5 . . . 18
12)1413 15
117 9

Ans. 117*lb.* 9*oz.* 15*pwt.* 18*gr.*

(5)

pwt.

2|0)879|4
12)439 . . . 14
36 . . . 7

Ans. 36*lb.* 7*oz.* 14*pwt*

(6)

pwt.
2|0)75641|2
12)37820 . . . 12
3151 . . . 8
Ans. 3151*lb.* 8*oz.* 12*pwt.*

(7)

lb.
897264
12
10767168*oz.*
20
215343360*pwt.*
24
86137844
43068672
Ans. 5168240640*gr.*

APOTHECARIES' WEIGHT.

(2)

℔	℥	ʒ	℈
27	9	6	1
12			
333			
8			
2670			
3			
Ans. 8011			

(3)

℔	℥	ʒ
94	11	1
12		
1139		
8		
Ans. 9113		

LONG MEASURE

(2)

mi. fur. rd.
59 7 38
8
479
40
Ans. 19198*rd.*

(4)

rods.
4|0)11518|8
8)2879 . . . 28
359 . . . 7
Ans. 359*mi.* 7*fur.* 28*rd.*

(5)

mi.	*fur.*	*rd.*
719	7	16
8		
5759		
40		
230376		
16½		
115188		
1382256		
230376		

Ans. 3801204*ft.*

(6)

°	°
118	118
69½	60
59	7080
1071	
708	
8210	

Ans. { 8210 *stat. miles.* 7080 *geog. miles.*

LAND OR SQUARE MEASURE.

(2)

A.	*R.*	*P.*
19	2	37
4		
78		
40		

Ans. 3157*P.*

(3)

a.
175
16
1050
175

Ans. 2800

(5)

P.

4|0)1497|2

4)374 . . . 12

93 . . . 2

Ans. 93*A.* 2*R.* 12*P.*

(6)

P.

4|0)367413|9

4)91853 . . . 19

640)22963 . . . 1 (35

1920

3763

3200

563

Ans. 35*M.* 563*A.* 1*R.* 19*P.*

SOLID OR CUBIC MEASURE.

(1)

Tons.
14
40
560
1728
4480
1120
3920
560
Ans. 967680 *S. in.*

(2)

C.
55
128
440
110
55
Ans. 7040 *S. ft.*

(3)

C.
25
8
Ans. 200

(5)

S. ft.
128)28160(220
256
256
256

(6)

Cord ft.
8)174964
Ans. 21870 . . . 4

(7)

S. in.
1728)7645900(4424
6912
7339
6912
4270
3456
8140
6912
1228

S. ft.
5|0)442|4
88 . . . 24

Ans. 88 *tons* 24 *S. ft.* 1228 *S. in.*

CLOTH MEASURE.

(2)

E. E.
49
5
245
4
Ans. 980*na.*

(3)

E. Fl. qr. na.
51 2 3
3
155
4
Ans. 623*na.*

(5)

na.
4)340
3)85
Ans. 28*E. Fl.* 1*qr.*

(6)

qr.
4)67
Ans. 16*yd.* 3*qr.*

LIQUID MEASURE.

(2)

pi. hhd. qt.
12 1 1
2
25
63
75
150
1575
4
6301
2
Ans. 12602*pt.*

(3)

tun.
1
4
4
63
12
24
252
4
1008
2
2016
4
Ans. 8064*qt.*

(5)

gi.
4)201632
2)50408
4)25204
63)6301
4)100 . . . 1
25

Ans. 25 *tuns.* 1*gal.*

(6)

gi.
4)16128
2)4032
4)2016
7)504
9)72
4)8

$63 = 7 \times 9$

Ans. 2 *tuns.*

ALE OR BEER MEASURE.

(1)

bar. gal. qt.
47 16 4
36
298
141
1708
4
6836
2

Ans. 13672 *pints.*

(2)

hhd.
27
54
108
135
1458
4
5832
2

Ans. 11664 *pints.*

(3)

pt.
2)55832
4)27916
9)6979
6)775 . . . 4
129 . . . 1

$54 = 9 \times 6$

Ans. 129*hhd.* 13*gal.*

(4)

qt.
4)64972
6)16243
6)2707 . . . 1
451 . . . 1

$36 = 6 \times 6$

Ans. 451*bar.* 7*gal.*

DRY MEASURE.

(1)

bu.
372
4
1488
8
11904
2
Ans. 23808 *pints.*

(2)

ch. *bu.*
5 31
36
61
15
211
4
Ans. 844 *pecks.*

(3)

pt.
2)17408
8)8704
4)1088
Ans. 272 *bushels.*

(4)

pt.
2)4220
8)2110
4)263 . . . 6
$36 = 6 \times 6$ { 6)65 . . . 3
6)10 . . . 5
1 . . . 4
Ans. 1*ch.* 29*bu.* 3*pk.* 6*qt.*

TIME.

(2)

da. *hr.* *m.* *sec.*
365 23 57 39
24
1483
730
8783
60
527037
60
31622259 *in one year.*
12
Ans. 379467108 *seconds.*

(3)

wk.
49
7
343
24
1372
686
8232
60
Ans. 493920*m.*

(5)

sec.

6|0)75695201|8
6|0)1261586|6 . . 58
$24=6\times4$ { 6)210264 . . . 26
4)35044
265)8761(24
730
1461
1460
1

Ans. 24*yr.* 1*da.* 26*m.* 58*sec.*

(6)

min.

6|0)592704|0
$24=6\times4$ { 6)98784
4)16464
7)4116

Ans. 588

CIRCULAR MEASURE OR MOTION.

(1)

s. °. ′.
5 29 25
30
179
60

Ans. 10765′

(2)

c.
360
2
720
60
43200
60

Ans. 2592000″

(3)

′.
6|0)3229|5
3|0)53|8 . . . 15
12)17 28
1 5

Ans. 1c. 5s. 28° 15′

(4)

″.
6|0)2789|4
6|0)46|4 . . . 54
7 44

Ans. 7° 44′ 54″

EXAMPLES—FROM A HIGHER TO A LOWER DENOMINATIC

(1)

wk.	*da.*	*hr.*
344	6	17
7		
2414		
24		
9673		
4828		
Ans. 57953		

(2)

s.
6
30
180
60
Ans. 10800′

(3)

tons.
15
50
750
1728
8640
12096
Ans. 1296000*S. i*

(4)

ft.	*in.*
16	6
12	
198*in.*	

198)5322240(26880
396
1362
1188
1742
1584
1584
1584
0

Ans. 26880 *times round.*

mi.
84
8
672
40
26880
5½
13440
134400
147840
3
443520
12
5322240

(5)

R.	*Sq. ft.*
28	129
30¼	
840	
7	
847	
9	
7752	
12	
Ans. $93024	

(6)

lb.	*pwt.*	*gr*
59	13	5
12		
708		
20		
14173		
24		
56697		
28346		
Ans. 340157*gr.*		

(7)

£85 8*s.*
20
21)1708(81
168
28
21
7
Ans. 81 *guineas* 7*s.*

(8)

36*ft.*
6
216
4
128)864(6
768
16)96(6
96
Ans. 6*C.* 6*C. ft.*

(9)

12
6
72)288(4
288
Ans. 4 *miles.*

(10)

1 *Sq. yd.* = 9 *Sq. ft.*
18
20
9)360
Ans. 40 *yards.*

(11)

E. F.
346
3
5)1038
Ans. $207\frac{3}{5}$ *E. E.*

(12)

50
60
3000 *in* 1 *hour.*
24
72000 *in* 1 *day.*

72|000)12000|000(166
72
480
432
480
432
3|000)48|000
16
Ans. 166*da.* 16*hr.*

(13)

gal.
63
4
252
2
Ans. 504 *bottles*

(14)

in.
24
24
96
48
576
24
2304
1152
Ans. 13824 *cubes.*

(15)

bu.
285
4
30)1140(38
90
240
240
Ans. 38 *casks.*

(16)

in. in a mile.

63360
3
190080
2

Ans. 380160*in.*

(17)

ft.	*in.*
10	6
12	
126	

63360
34
25344
19008

126)2154240(17097

126
894
882
1224
1134
900
882
18

Ans. $17097\frac{18}{126}$.

(18)

ft.	*in.*
104	8
12	
1256	

63360
12000

1256)760320000(605350

7536
6720
6280
4400
3768
6320
6280
400

Ans. $605350\frac{400}{1256}$.

(19)

29
36
174
87
1044
3
3132
4

Ans. 12528*na.*

(20)

hhd.	*gal.*	*qt.*
3	13	2
63		
202		
4		
810		
4		
Ans. 3240	*half pt.*	

(21)

T.	*cwt.*	*qr.*	*lb.*	*dr.*
12	15	1	19	12
20				
255				
4				
1021				
25				
5124				
2042				
25544				
16				
153264				
25544				
408704				
16				
2452236				
408704				
Ans. 6539276	*dr.*			

(22)

yr.	*da.*
32	40
365¼	
770	
1095	
8	
11728	
24	
46912	
23456	
281472	
60	
16888320	
60	
Ans. 1013299200	*sec.*

(23)

24	*C.*
128	
512	
256	
3072	
1728	
24576	
6144	
21504	
3072	
Ans. 5308416	*S. in.*

(24)

63360	*in.*
25000	
31680	
12672	
1584000000	
3	
Ans. 4752000000	*bar.*

(25)

A.	*R.*	*P.*
583	3	10
4		
2335		
40		
Ans. 93410	*P.*	

(26)

	yd.
	190
	4
	760
	4
Ans.	3040*na.*

(27)

	yr.
	1838
	1776
	62
	365¼
	730
	2190
	15½ *hr.*
	22645 12
	24
	90592
	45290
	543492
	60
	32609520
	60
Ans.	1956571200

(28)

	cwt.	*qr.*	*lb.*
	18	3	24
	4		
	75		
	25		
	399		
	150		
	1899		
	3		
	5697		
	3		
Ans.	$170,91		

(29)

	hhd.	*gal.*	*qt.*
	24	18	2
	63		
	90		
	144		
	1530		
	4		
	6122		
	2		
Ans.	12244*pt.*		

(30)

	yd.	*qr.*	*na.*
	341	3	1
	4		
	1367		
	4		
Ans.	5469*na.*		

(31)

M.

197111024
640
7884440960
1182666144
12615463605360
4
504604221440
40
20184168857600
30¼
5046042214400
605525065728000
610571107942400
9
5495139971481600
144
219805598859264
219805598859264
54951399714816
Ans. 791300155893350400

(32)

Tons.

18
40
720
1728
3456
12096
1244160 *S. in.*

(33)

pi.

24
2
48
63
144
288
3024
4
12096
2
24192
4
Ans. 96768 *gi.*

(34)

bar.

95
36
570
285
3420
4
13680
2
Ans. 27360 *pt.*

(35)

ch.

84
36
504
252
3024
4
Ans. 12096 *pk.*

(36)

yr.	*wk.*	*da.*	*hr.*	*m.*	*sec.*
15	2	5	13	38	48
52					
32					
75					
782					
7					
5479					
24					
21929					
10958					
131509					
60					
7890578					
60					
Ans. 473434728*sec.*					

(37)

s.	°	′
9	13	25
30		
283		
60		
17005		
60		
Ans. 1020300″.		

(38)

A.	*R.*	*P.*
35	2	24
4		
142		
40		
5704		
30¼		
1426		
171120		
172546		
9		
Ans. 1552914*Sq. ft.*		

(39)

in.
63360
241
6336
25344
12672
Ans. 15269760*in.*

(40)

E.	*E.*
302	
5	
4)1510	
377 . . .	2
Ans. 377*yd.* 2*qr.*	

(41)

cwt.	*lb.*
11	25
100	
1125	
24	
4500	
2250	
Ans. 27000*lb.*	

(42)

oz.	*pwt.*
9	5
20	
185	
24	
740	
370	
4440	
30	
Ans. 133200	

(43)

cwt.	*qr.*	*lb.*
12	4	12
4		
52		
25		
272		
104		
1312		
12		
Ans. $157,44		

(44)

hhd.	*gal.*	*qt.*	*pt.*
2	16	3	1
63			
142			
4			
571			
2			
1143			
6			
Ans. $68,58			

(45)

14
17
98
14 5)39984
238 7996*E. E.* . . . 4
56
1428
1190 6)39984
13328 6664*E. Fr.*
3
4)39984*qr.*
9996*yd.*

Ans. { 9996*yd.*
7996*E. E.* 1*yd.*
6664*E. Fr.*

(46)

qr.
4)704121
6)176030 . . . 1
2|0)2933|8 . . . 2 . . . 2×4+1=9
12)1466 . . . 18
122 2
Ans. 122*lb.* 2*oz.* 18*pwt.* 9*gr.*

EXAMPLES—FROM A LESS TO A GREATER DENOMINATION.

(1)

d.
12)171360
2|0)1428|0
Ans. £714

(2)

lb. *oz.* *pwt.* *gr.*
63 7 10 11
12
763
20
15270
24
61091
30540
366491
20
Ans. $73298,20

(3)

far.
4)243648
12)60912
6)5076
Ans. $846

(4)

cts.
2|0)551040|0
4)275520*gr.*
6)68880
2|0)1148|0
12)574
47 . . . 10
Ans. 47*lb.* 10*oz.*

(5)

cts.
2)14647000
4)7323500*dr.*
4)1830875
4)457718 . . . 3=3×4=12
4)114429 . . . 2
5)28607 . . . 1 . . . 1×4+2=6
5)5721 . . . 2
4)1144 . . . 1 . . . 1×5+2=7
2|0)28|6
14 6

Ans. 14T. 6cwt. 7*lb.* 6*oz.* 12*dr.*

(6)

dr.
4)1720320
4)430080
4)107520
4)26880
5)6720
5)1344
4)268 . . . 4=4×5=20
2|0)6|7
3 7
Ans. 3*T.* 7*cwt.* 20*lb.*

(7)

470
26
282
94
1|00)122|20*lb.*
122 . . . 20
Ans. 122*cwt.* 20*lb.*

(8)

gr.
2|0)5579|9
3)2789 . . . 19
8)929 . . . 2
12)116 . . . 1
9 . . . 8
Ans. 9℔ 8℥ 13 ʒ 19*gr.*

(9)

cts.
6)82080
2)13680*pt.*
4)6840
36)1710(47
144
270
252
18
Ans. 47*bar.* 18*gal.*

(10)

gr.
4)97397
6)24349 . . . 1
2|0)405|8 . . . 1 . . . 1×4+1=5
12)202 . . . 18
16 . . . 10
Ans. 16*lb.* 10*oz.* 18*pwt.* 5gr.

(11)

bar.

3)9511603200
12)3170534400
3)264211200
11)88070400
8006400
2
4|0)1601280|0
8)400320
50040
2
139)100080(720
973
278
278
0

Ans. 720*deg.*

(12)

5|0)200000|0
6|0)4000|0
4)666 . . . 40
6)166 . . . 2
27 . . . 4 . . . 4×4+2=

Ans. 27*da.* 18*hr.* 40*m.*

(13)

″

6|0)129600|0
6|0)2160|0
3|0)36|0

Ans. 12*s.*

(14)

in.

12)63360
3)5280
11)1760
160
2
4|0)32|0
8)8

Ans. 1*mi.*

(15)

sec.

6|0)3155760|0
6|0)52596|0
4)8766
6)2191 . . . 2
365 . . . 1 . . . 1×4+2=
=365¼*da.*=1*yr. Ans.*

(16)

pt.

2)2016
4)1008
63)252
4)4

Ans. 1 tun.

(17)

Sq. in.
)4014489600
2)334540800
9)27878400
11)3097600
11)281600
25600
4
4|0)10240|0
4)2560
640)640
Ans. 1*M.*

(18)

gr.
2|0)1152|0
3)576
8)192
12)24
Ans. 2*lb.*

(19)

m.
6|0)12345672|0
4)2057612
6)514403
$365\frac{1}{4}$)85733 . . . 5 . . . 5×4=20
$730\frac{1}{2}$ (234
1268
$1095\frac{3}{4}$
$1725\frac{1}{2}$
1461
$264\frac{1}{2}$*da.*=264*da.* 12*hr.*
Ans. 234*yr.* 265*da.* 8*hr.*

(20)

″
0)81148|0
0)1352|4 . . . 40
|0)22|5 . . . 24
7 . . . 15
ns. 7*s.* 15° 24′ 40″

(21)

S. in.
1728)2654208(1536
1728
9262
8640
6220
5184
10368
10368

128)1536(12
128
256
256

Ans. 12C.

(22)

in.

12)15713280
3)1309440
11)436480
39680
2
4|0)7936|0
8)1984
Ans. 248*mi.*

(23)

sec.

6|0)39979489|0
6|0)666324|8 . . . 10
4)111054 . . . 8
6)27763 . . . 2
$365\frac{1}{4}$)4627 . . . 1 . . . 1×4+2=
$365\frac{1}{4}$)(12
$974\frac{1}{4}$
$730\frac{1}{2}$
244
Ans. 12*yr.* 244*da.* 6*hr.* 8*m*

(24)

sheets.

4)4320
6)1080
2|0)18|0
Ans. 9 *reams.*

(25)

sec.

6|0)3155692|8
6|0)52594|8 . . 48
4)8765 . . . 48
6)2191 . . . 1
365)365 . . . 1 . . . 1×4
1
Ans. 1*yr.* 5*hr.* 48

(26)

Sq. in.

12)791300159907840000
12)65941679992320000
9)5495139999360000
11)610571111040000
11)55506464640000
5046042240000
4
4|0)2018416896000|0
4)504604224000
64|0)12615105600|0(197111025
64
621
576
455
448
71
64
70
64
65
64
160
128
320
320

(27)

na.

4)760
4)190
47...2

Ans. 47*yd.* 2*qr.*

Ans. 197111025*M.*

ADDITION OF DENOMINATE NUMBERS.

(3)

	£	*s.*	*d.*
Ans.	1598	1	$1\frac{3}{4}$

TROY WEIGHT.

(1)

	lb.	*oz.*	*pwt.*	*gr.*
Ans.	621	8	1	19

(2)

	lb.	*oz.*	*pwt.*	*gr.*
Ans.	962	6	10	2

APOTHECARIES' WEIGHT.

(1)

	lb	℥	3	℈	*gr.*
Ans.	104	3	3	1	16

(2)

	℥	3	℈	*gr.*
Ans.	35	7	2	5

(3)

	3	℈	*gr.*
Ans.	20	0	22

AVOIRDUPOIS WEIGHT.

(1)

	cwt.	*qr.*	*lb.*	*oz.*	*dr.*
Ans.	79	2	18	15	11

(2)

	T.	*cwt.*	*qr.*	*lb.*	*oz.*
Ans.	340	5	2	20	2

(3)

	cwt.	*qr.*	*lb.*	*oz.*	*dr.*
	3	1	25	12	3
	4	1	21	4	
	4				
	3	3	27	15	15
Ans.	16	0	0	0	2

LONG MEASURE.

(1)

	L.	*mi.*	*fur.*	*rd.*
Ans.	432	2	4	35

(2)

	yd.	*ft.*	*in.*	*bar.*
Ans.	624	1	5	2

CLOTH MEASURE.

(1)

	E. Fl.	*qr.*	*na.*
Ans.	424	0	3

(2)

	yd.	*qr.*	*na.*
Ans.	42	3	1

(3)

	E. E.	*qr.*	*na.*
Ans.	184	3	3

LAND OR SQUARE MEASURE.

(1)

	Sq. yd.	*Sq. ft.*	*Sq. in.*
Ans.	263	5	116

(2)

	M.	*A.*	*R.*	*P.*
Ans.	27	277	0	38

(3)

	A.	*R.*	*P.*
	12	2	38
	4	1	26
	85	0	19
	57	1	2
Ans.	159	2	5

SOLID OR CUBIC MEASURE.

(1)

	S. yd.	*S. ft.*	*S. in.*
Ans.	176	18	614

(2)

	C.	*S. ft.*
Ans.	90	106

(3)

	C.	*cord ft.*
Ans.	151	3

LIQUID MEASURE.

(1)

	hhd.	*gal.*	*qt.*	*pt.*
Ans.	627	7	1	1

(2)

	tun	*pi.*	*hhd.*	*gal.*	*qt.*
Ans.	50	0	1	38	3

DRY MEASURE.

(1)

	ch.	*bu.*	*pk.*	*qt.*	*pt.*
Ans.	94	22	3	7	1

(2)

	ch.	*bu.*	*pk.*	*qt.*	*pt.*
Ans.	259	12	0	0	1

TIME.

(1)

	yr.	*mo.*	*wk.*	*da.*	*hr.*
Ans.	172	2	1	4	4

(2)

	wk.	*da.*	*hr.*	*m.*	*sec.*
Ans.	50	4	1	41	34

APPLICATIONS IN ADDITION.

(1)

	lb.	*oz.*	*pwt.*	*gr.*
	46	9	15	16
	87	10	6	14
	100	10	10	10
	56	0	3	6
Ans.	291	6	15	22

(2)

	lb.	*oz.*	*pwt.*	*gr.*
	46	8	13	14
	97	3	0	0
	100	5	10	13
Ans.	244	5	4	3

(3)

	T.	*cwt.*	*qr.*	*lb.*	*oz.*	*dr.*
	29	16	1	14	12	9
	0	18	3	1	0	0
	50	0	3	0	[illegible]	0
	2	0	1	0	0	14
Ans.	82	16	0	16	1	7

(4)

	T.	*cwt.*	*qr.*	*lb.*	*oz.*	*dr.*
	39	10	1	27	15	12
	0	17	0	6	0	0
	0	12	3	0	0	0
	0	0	2	8	0	9
A.	41	0	3	17	0	5

(5)

	℔	℥	ʒ	℈	*gr.*
	19	10	4	2	16
	0	9	7	0	17
	3	6	5	1	18
A.	24	3	1	2	11

(6)

	yd.	*qr.*	*na.*
	19	2	3
	14	2	1
	32	0	1
	0	2	2
	57	3	2
Ans.	124	3	1

(7)

	deg.	*mi.*	*fur.*	*rd.*	*ft.*	*in.*	*bar.*
	64	38	4	26	15	10	2
	0	49	7	38	12	9	1
	0	0	6	20	0	0	0
	0	9	3	29	9	8	0
Ans.	65	28½	6	35	5	4	0

(8)

	A.	*R.*	*P.*	*Sq. ft.*	*Sq. in.*
	314	2	39	200	136
	16	1	20	10	0
	0	3	36	0	0
	4	1	16	0	0
Ans.	336	1	31	210	136

(9)

	ton	*S. ft.*	*S. in.*
	64	33	800
	9	0	1200
	0	25	700
	95	31	1500
Ans.	170	11	744

(10)

	A.	*R.*	*P.*	*Sq. ft.*	*Sq. in.*
	20	3	15	250	116
	19	1	39	0	0
	0	2	10	60	0
	5	*0*	6	0	50
Ans.	*45*	*3*	31	38¾	22

(11)

	ton	*S. ft.*	*S. in.*
	49	19	1666
	19	10	1001
	16	36	109
	4	17	1727
Ans.	90	4	1047

(12)

	tuns	hhd.	gal.	qt.	pt.	gi.
	67	2	60	3	1	3
	19	3	10	2	0	1
	47	1	20	1	1	1
	90	2	10	3	0	2
Ans.	225	1	39	2	1	3

(13)

	tuns	pi.	gal.	pt.
	1	1	116	3
	0	1	48	0
	5	1	86	3
	0	0	102	0
	4	0	0	0
Ans.	12	1	101	2

(14)

	tuns	hhd.	gal.	qt.	pt.	gi.
	49	3	4	3	1	2
	19	2	37	1	0	0
	0	1	51	0	0	0
	74	3	19	2	1	2
Ans.	144	2	49	3	1	0

(15)

	bu.	pk.	qt.	pt.
	96	3	2	1
	46	3	1	1
	0	2	1	1
	23	3	4	1
Ans.	168	0	2	0

(16)

	yr.	da.	hr.	min.	sec.
	49	320	14	49	37
	0	360	19	8	45
	76	200	0	0	0
	16	150	20	54	45
A.	143	301½	6	53	7

(17)

	yr.	da.	hr.	min.	sec.
	24	67	19	43	34
	0	300	10	0	0
	0	290	0	50	0
	87	320	0	51	0
A.	112	247½	7	24	34

(18)

	s.	°.	′.	″.
	9	20	34	37
	0	17	36	44
	7	28	39	14
	8	24	38	55
Ans.	27	1	29	30

(19)

	s.	°.	′.	″.
	5	20	30	40
	7	0	54	0
	8	9	0	45
	0	29	16	54
Ans.	21	29	42	19

(20)

	reams	quires	sheets.
	76	19	23
	16	8	13
	4	0	0
	90	11	8
Ans.	187	19	20

SUBTRACTION OF DENOMINATE NUMBERS.

(3)

	lb.	*oz.*	*pwt.*	*gr.*
Ans.	174	1	1	3

(4)

	lb.	*oz.*	*pwt.*	*gr.*
Ans.	8	10	14	12

(5)

	T.	*cwt.*	*qr.*	*lb.*	*oz.*
Ans.	5	7	1	23	11

(6)

	cwt.	*qr.*	*lb.*	*oz.*	*dr.*
Ans.	7	2	20	11	5

APPLICATIONS.

(1)

	mo.	*wk.*	*da.*	*hr.*	*min.*
	38	2	3	7	10
	10	3	2	10	50
Ans.	27	3	0	20	20

(2)

	yr.	*mo.*	*wk.*	*da.*
	176	8	3	4
	91	9	2	6
Ans.	84	11	0	5

(3)

	tuns	*hhd.*	*gal.*	*qt.*
	6	0	0	0
	0	3	15	3
Ans.	5	0	47	1

(4)

	£	*s.*
	3	0
	0	3
Ans.	2	17

(5)

	lb.	*oz.*	*pwt.*	*gr.*
	2	0	0	0
	0	0	0	20
Ans.	1	11	19	4

(6)

	℔	℥	ʒ	℈
	8	0	0	0
	1	1	2	2
Ans.	6	10	5	1

(7)

	T.	*cwt.*	*qr.*	*lb.*	*oz.*	*dr.*
	9	0	0	0	0	0
	1	1	2	20	15	14
Ans.	7	18	1	4	0	2

(8)

	m.	*fur.*	[illegible]
	3	0	[illegible]
	0	3	[illegible]
Ans.	2	4	21

(9)

	yr.	mo.	da.
	1782	0	20
	1774	3	19
Ans.	7	9	1

(10)

	yr.	mo.	da.
	1837	6	25
	1491	9	11
Ans.	345	9	14

(11)

	lb.	oz.	pwt.	gr
	167	8	16	10
	98	10	12	19
Ans.	68	10	3	15

(12)

	T.	cwt.	qr.	lb.	oz.	dr.
	19	11	1	27	12	12
	17	13	2	19	14	10
Ans.	1	17	3	7	14	2

(13)

	℔	℥	ʒ	℈	gr.
	101	11	7	2	19
	17	2	3	1	5
Ans.	84	9	4	1	14

(14)

	℔	℥	ʒ	℈	gr.
	93	10	5	1	19
	34	9	4	2	0
Ans.	59	1	0	2	19

(15)

	yd.	qr.	na.	in.
	46	1	3	0
	42	3	1	2
Ans.	3	2	1	$\frac{1}{4}$

(16)

	mi.	fur.	rd.	ft.	in.
	25000	0	0	0	0
	43	0	17.	0	9
Ans.	24956	7	22	15$\frac{1}{2}$	3

(17)

	C.	S.	ft.
	7	0	
	2	78	
Ans.	4	50	

(18)

	yd.	qr.	na.
	15	0	0
	3	2	1
Ans.	11	1	3

(19)

	hhd.	gal.	qt.	pt.
	1	0	0	0
	0	8	3	1
Ans.	0	54	0	1

(20)

	A.	R.	P.
	73	0	0
	5	3	1
Ans.	67	0	39

(21)

	£	s.	d.
	100	0	0
	0	3	6$\frac{1}{2}$
Ans.	99	16	5$\frac{1}{2}$

(22)

	bu.	*pk.*	*qt.*	*pt.*
	136	0	0	0
	49	2	7	1
Ans.	86	1	0	1

(23)

	hhd.	*gal.*	*qt.*	*pt.*
	174	10	1	1
	86	17	2	1
Ans.	87	46	3	0

(24)

	bu.	*pk.*	*qt.*	*pt.*
	576	1	2	0
	139	2	3	1
Ans.	436	2	6	1

(25)

	cwt.	*qr.*	*lb.*
	17	2	14
	3	2	20
	13	3	19
	6	1	5
Ans.	7	2	14

(26)

	yr.	*mo.*	*wk.*	*da.*	*hr.*	*m.*	*sec.*
	81	6	3	1	21	0	16
	29	10	2	4	16	38	45
Ans.	51	8	0	4	4	21	31

(27)

	yr.	*mo.*	*wk.*	*da*	*hr.*	*m.*	*sec.*
	31	10	2	4	7	24	49
	10	10	2	2	7	59	14
Ans.	21	0	0	1	23	25	35

(28)

	£	*s.*
	2917	10
	1675	13
Ans.	1241	16

(29)

	cwt.	*qr.*	*lb.*
	12	3	27
	4	0	26
	8	3	1
	3	3	0
	5	0	1
	2	0	1
Ans.	3	0	0

(30)

	hhd.	*gal.*	*qt.*	*pt.*	*gi.*
	1	0	0	0	0
	0	10	3	1	2
	0	52	0	0	2
	0	12	3	1	3
	0	39	0	0	3
	0	15	3	1	2
Ans.	0	23	0	1	1

(31)

	yd.	*qr.*	*na.*
	145	3	0
	95	2	3
Ans.	50	0	1

(32)

	£	*s.*	*d.*
	375	10	0
	122	11	3
Ans.	252	18	9

(33)

	T.	*cwt.*	*qr.*	*lb.*	*oz.*	*dr.*
	375	15	3	19	7	12
	205	17	1	27	9	15
Ans.	169	18	1	16	13	13

APPLICATIONS IN ADDITION AND SUBTRACTION.

(1)

	£	*s.*	*d.*
	2	7	9
	0	9	7
	4	10	11
	19	12	8½
Ans.	27	0	11½

(2)

	lb.	*oz.*	*pwt.*	*gr.*
	3	4	9	21
	2	1	1	0
	16	10	15	16
Ans.	22	4	6	13

(3)

	cwt.	*qr.*	*lb.*	*oz.*
	9	2	27	14
	3	0	27	0
	2	3	26	4
Ans.	16	0	6	2

(4)

cwt.	*qr.*	*lb.*
8	3	21
9	2	6
18	1	27

cwt.	*qr.*	*lb.*	*oz.*
3	1	12	14
2	3	15	6
6	1	3	4

	cwt.	*qr.*	*lb.*	*oz.*
	18	1	27	0
	6	1	3	4
Ans.	12	0	23	12

(5)

L.	mi.	fur.	rd.
9	2	7	30
12	1	1	0
14	0	0	0
15	2	5	35
52	0	6	25

	L.	mi.	fur.	rd.
200mi. =	66	2	0	0
	52	0	6	25
Ans.	14	1	1	15

(6)

A.	R.	P.
9	3	37
10	2	25
20	2	22

A.	R.	P.
12	1	1
13	3	0
6	1	39
32	2	0

	A.	R.	P.
	32	2	0
	20	2	22
Ans.	11	3	18

(7)

From Jan. 1st, 1776, to July 4th, at 12, 184*da.* 12*hr.*

yr.	da.	hr.	min.
1832	0	15	25
1775	184	12	00
56	181	3	25

(8)

	bu.	pk.	qt.
	657	3	6
	257	1	1
	459	2	7
Ans.	1374	3	6

	bu.	pk.	qt.
	657	3	6
	459	2	7
Ans.	198	0	7

(9)

From Dec. 8, 1759, to Jan. 1st, 1760, is 23 days.

yr.	mo.	da.
1794	5	4
1759		
35	5	4
		23
Ans.	35*yr.*	5*mo.* 27*da.*

(10)

£	s.	d.
250	19	8
75	10	6
37	11	9
364	1	11

£	s.	d.
600	0	0
364	1	11
Ans. 235	18	1

MULTIPLICATION OF DENOMINATE NUMBERS.

CASE I.

(3)

s.	d.
9	6
	3
Ans. £1	8*s.* 6*d.*

(4)

s.	d.
9	6
	12
Ans. £5	14*s.* 0*d.*

(5)

£	s.	d.
1	11	5
		9
A. £14	2*s.*	9*d.*

APPLICATIONS.

(2)

s.	d.
9	9
	9
Ans. £4	7 9

(3)

bu.	*pk.*	*qt.*
2	1	3
		11
Ans. 25	3	1

(4)

s.	d.
9	6
	12
Ans. £5	14 0

(5)

T.	*cwt.*	*qr.*	*lb.*
	3	2	27
			12
Ans. 2	5	0	24

(6)

cord	*C. ft.*
1	2
	7
Ans. 8	6

CASE II.

(1)

£	s.	d.
6	2	9
		6
36	16	6
		8
Ans. 294	12	0

(2)

£	s.	d.
2	11	8
		6
15	10	0
		4
Ans. 62	0	0

(3)

£	s.	d.
1	14	6
		6
10	7	0
		7
Ans. 72	9	0

(4)

	£	s.	d.
		5	9
			12
	3	9	0
			10
Ans.	34	10	0

(5)

	gal.	qt.	pt.	gi.
	62	1	1	1
				12
	748	3	1	0
				8
Ans.	5991	0	0	0

CASE III.

(3)

195
4*d.*
780*d.* = £3 5*s.*

195
2*s.*

	£	s.
390*s.* =	19	10
	3	5
Ans.	£22	15

(4)

46
1*far.* *d.* *far.*
46 = 11 2

46
7*d.* *s.* *d.*
322 = 26 10

46
4*s.* £ *s.* *d.* *far.*
184 = 9 4
26 10
11 2
Ans. £10 11 9 2

(5)

117
3*d.* *s.* *d.*
351 = 29 3

117
2*s.* £ *s.*
234 = 11 14

117
1 £ *s.* *d.*
117 117
11 14
29 3
Ans. 130 3 3

APPLICATIONS.

(1)

£	s.	d.
13	8	9½
		12
161	5	6
		8
£1290	4	0

(2)

oz.	pwt.	gr.
3	5	15
		120
32lb. 9	15	0

(3)

mi.	fur.	rd.
24	7	4
		30
746	5	0

(4)

15′
60
6|0)90|0
15°

(5)

da.	hr.	m.	sec.
2	5	17	19
			6
13	7	43	54
			6
79	22	23	24
			10
2yr. 68	19	54	0

(6)

gal.	qt.	pt.
3	1	1
		52
2hhd. 49	2	0

(7)

yr.	mo.	da.
1830	2	12
1824	4	21
5	9	21
		3
17	5	3

(8)

cwt.	qr.	lb.
12	2	11
		90
56T. 14	3	15

(9)

s.	d.
5	9½
	6
£1 14	9
	3
£5 4	3

(10)

s.	d.
11	6
	11
£6 6	6
	2
A. £12 13	0

(11)

oz.	pwt.
3	6
	12
A. 3lb. 3	12

(12)

	cwt.	*qr.*	*lb.*	
	5	2	16	
			7	
Ans.	1*T.*	19	2	12

(13)

	℔	℥	ʒ	℈	*gr.*
	3	4	6	1	16
					4
Ans.	13	7	2	1	4

(14)

	mi.	*fur.*	*rd.*
	24	4	4
			5
Ans.	122	4	20

(15)

	gal.	*qt.*	*pt.*
	61	1	1
			5
	306	3	1
			5
Ans.	1534	1	1

(16)

	yd.	*qr.*
	25	3
		6
	154	2
		6
Ans.	927	0

(17)

	A.	*R.*	*P.*
	12	2	25
			9
Ans.	113	3	25

(18)

	yd.	*qr.*	*na.*
	29	2	3
			9
A.	267	0	3

(19)

	L.	*mi.*	*fur.*	*rd.*
	5	2	6	36
				8
A.	47	1	7	8

(20)

	A.	*R.*	*P.*
	41	2	11
			6
	249	1	26
			3
Ans.	748	0	38

(21)

	yr.	*mo.*	*wk.*	*da.*
	20	5	3	6
				7
	143	5	3	0
				2
Ans.	286	11	2	0

(22)

	cwt.	*qr.*	*lb.*	
	12	2	14	
			9	
	113	3	1	
			10	
Ans.	56*T.*	17	2	10

(23)

	mi.	*fur.*	*rd.*
	49	6	8
			30
Ans.	1493	2	0

(24)

	bu.	*pk.*	*qt.*
	125	3	6
			50
Ans.	6296	3	4

(25)

	oz.	*pwt.*	*gr.*
	3	5	15
			40
10*lb.*	11	5	0
			6
Ans. 65*lb.*	7	10	0

(26)

	yd.	*qr.*	*na.*
	3	1	1
			11
Ans.	36	1	3

(27)

	mi.	*fur.*	*rd.*
	211	4	32
			5
	1058	0	0
			3
Ans.	3174	0	0

BILLS OF PARCELS.

A Hosier's Bill.—No. 1.

		s.	*d.*		£	*s.*	*d.*
8 Pairs	worsted stockings, at	4	6	*per pair.*	1	16	
5 "	thread ditto, - - at	3	2	"		15	10
5 "	black silk ditto, - at	14		"	3	10	
6 "	black worsted ditto, at	4	2	"	1	5	
4 "	cotton ditto, - - at	7	6	"	1	10	
2 Yards	fine flannel, - - at	1	8	*per yard.*		3	4
				Ans.	£9	0	2

A Mercer's Bill.—No. 2.

		s.	*d.*		£	*s.*	*d.*
15 Yards	satin, - - - - at	9	6	*per yard.*	7	2	6
18 "	flowered silk, - at	17	4	"	15	12	
12 "	rich brocade, - at	19	8	"	11	16	
16 "	sarcenet, - - at	3	2	"	2	10	8
13 "	Genoa velvet, - at	27	6	"	17	17	6
23 "	lutestring, - - at	6	3	"	7	3	
				Ans.	£82		

No. 3.

			s.	d.		£	s.	d.
92	Ivory combs	at	3	5¼	=	15	16	3
94	Pounds of colored thread	at	6	9¾	=	31	16	5½
102	Yards of durant,	at	1	8	=	8	10	0
104	Silk vests	at	6	7	=	34	4	8
106	Leghorns,	at	11	9½	=	62	9	11
114	Pairs of nankin	at	8	3¾	=	47	7	7½
116	Pounds of white thread	at	9	11¼	=	57	12	9
123	Pairs half hose	at	3	6	=	21	10	6
148	Yards of muslin	at	1	8	=	12	6	8
					Ans.	£291	14	10

No. 4.

			s.	d.		£	s.	d.
90	Yards of broadcloth	at	8	4	*per yard.*	37	10	0
100	" " "	at	10	6	"	52	10	0
112	Yards of satinet	at	3	7½	"	20	6	0
126	" " "	at	12	11¾	"	81	15	4½
144	" " "	at	19	11	"	143	8	0
162	" " "	at	9	3	"	74	18	6
70	Yards of bombazine	at	19	7½	"	68	13	9
198	Yards of Italian silk	at	16	0½	"	158	16	3
132	" " "	at	8	11	"	58	17	0
66	" " "	at	16	11½	"	55	19	3
					Ans.	£752	14	1½

DIVISION OF DENOMINATE NUMBERS.

(2)

£	s.	d.
5)16	8	9
Ans. 3	5	9

(3)

£	s.	d.
9)27	19	6
Ans. 3	2	2

(5)

	£	s.	d.	far.
4)821	17	9	3	
Ans. 205	9	5	$1\frac{3}{4}$	

(6)

	£	s.	d.	far.
7)55	14	0	3	
Ans. 7	19	1	$3\frac{2}{7}$	

(7)

	cwt.	qr.	lb.	oz.
7)16	3	27	6	
Ans. 2	1	18	$3\frac{1}{7}$	

(8)

	yd.	qr.	na.
9)49	3	3	
Ans. 5	2	$0\frac{7}{9}$	

(9)

	A.	R.	P.
12)131	1	0	
Ans. 10	3	30	

When the divisor is a composite number.

(2)

	£	s.	d.
5)57	3	4	
7)11	8	8	
Ans. 1	12	8	

(3)

	£	s.	d.
9)85	4		
8) 9	9	4	
Ans. 1	3	8	

(4)

	£	s.	d.	far.
11)31	2	10	2	
9)2	16	7	2	
Ans. 0	6	3	$\frac{2}{9}$	

GENERAL EXAMPLES.

(1)

£ s. d.

53)1138 12 4(21
106
78
53
25
20
53)512(9
477
35
12
53)424(8
424

Ans. £21 9*s.* 8*d.*

(2)

cwt. *qr.* *lb.*

79)1417 0 7(
79
627
553
74
4
79)296(3
237
59
25
302
118
79)1482(18
79
692
632
60

Ans. 17*cwt.* 3*qr.* $18\frac{60}{79}$

(3)

£ *s.* *d.*

37)23 15 $7\frac{1}{4}$(0
00
23
20
37)475(12
37
105
74
31
12
37)379(10
37
09
4
37)37(1
37

Ans. 12*s.* $10\frac{1}{4}$*d.*

(4)

£ *s.* *d.*

53)199 3 10
159
40
20
53)803(15
53
273
265
8
12
53)106(2
106

Ans. £3 15*s.* 2

APPLICATIONS.

(1)

£	s.	d.	far.	
65)72	14	4	2(1	
65				
7				
20				
65)154(2				
130				
24				
12				
65)292(4				
260				
32				
4				
65)130(2				
130				

Ans. £1 2*s.* 4*d.* 2*far.*

(2)

£	s.	
64)30	8(0	
00		
30		
20		
64)608(9		
576		
32		
12		
64)384(6		
384		

Ans. £0 9*s.* 6*d.*

(3)

£	s.	d.	
144)96	0	0(0	
00			
96			
20			
144)1920(13			
144			
480			
432			
48			
12			
144)576(4			
576			

Ans. £0 13*s.* 4*d.*

(4)

T.	cwt.	qr.	lb.	
7	16	3	12	
20				
63)156(2				
126				
30				
4				
63)123(1				
63				
60				
25				
63)1512(24				
126				
252				
252				

Ans. 2*cwt.* 1*qr.* 24*lb.*

(5)

bu. *pk.* *qt.*

105)232 3 7(2
210
22
4
91
8
105)735(7
735

Ans. 2*bu.* 7*qt.*

(6)

cwt. *qr.* *lb.* *oz.*

13 2 15 6
4
54
25
285
108
176)1365(7
1232
133
16
804
133
177)2134(12
176
374
352
22
16
132
22
176)352(2
352

Ans. 7*lb.* 12*oz.* 2*dr.*

(7)

£ *s.* *d.*

2 18 8
20
58
12
62)704(11
62
84
62
22
4
62)88(1
62
26

Ans. 11*d.* $1\frac{26}{62}$ *far.*

(8)

£ s. d.
71 14 0
20
92)1434(15
92
514
460
54
12
92)648(7
644
4

Ans. 15*s.* $7\frac{4}{92}$*d.*

(9)

T. *cwt.* *qr.* *lb.*
56 14 3 15
20
9|0)113|4
12 . . . 54
4
9|0)21|9
2 . . . 39
25
210
78
9|0)99|0
11

Ans. 12*cwt.* 2*qr.* 11*lb.*

(10)

£ s. d.
192)1290 4 0(6
1152
138
20
192)2764(14
192
844
768
76
12
192)912(4
768
144
4
192)576(3
576

Ans. £6 14*s.* $4\frac{3}{4}$*d.*

(11)

°
15
60
6|0)90|0

Ans. 15′

(12)

£ s. d.
106)1001 9 7(9
954
47
20
106)949(8
848
101
12
106)1219(11
106
159
106
53
4
106)212(2
212

Ans. £9 8*s.* $11\frac{1}{2}$*d.*

(13)

£ s. d.
23 11 5¼
20
57)471(8
456
15
12
57)185(3
171
14
4
57)57(1
57
Ans. 8*s.* 3¼*d.*

(14)

hhd. gal. qt. pt.
44 53 2 1
63
185
264
59)2825(47
236
465
413
52
4
59)210(3
177
33
2
59)67(1
59
8
Ans. 47*gal.* 3*qt.* 1 8/59 *pt.*

(15)

gal. qt.
52)175 2(3
156
19
4
52)78(1
52
26
2
52)52(1
52
Ans. 3*gal.* 1*qt.* 1*pt.*

(16)

bu. pk. qt.
35)168 1 6(4
140
28
4
35)113(3
105
8
8
35)70(2
70
Ans. 4*bu.* 3*pk.* 2*qt.*

(17)

	lb.	*oz.*	*pwt.*	*gr.*
7)98	2	19	5	
Ans.	14	0	8	11

(18)

	hhd.	*gal.*	*qt.*	
12)9	28	2		
Ans.	0	49	2	1*pt.*

(19)

T.	*cwt.*	*qr.*	*lb.*	*oz.*	*dr.*
346)810	11	0	20	13	4(2
692					
118					
20					
346)2371(6					
2076					
295					
4					
346)1180(3					
1038					
142					
25					
730					
284					
346)3570(10					
346					
110					
16					
673					
110					
346)1773(5					
1730					
43					
16					
262					
43					
346)692(2					
692					

Ans. 2*T.* 6*cwt.* 3*qr.* 10*lb.* 5*oz.* 2*dr.*

(20)

	bu.	*pk.*	*qt.*
12)65	1	3	
Ans.	5	1	$6\frac{3}{12}$

(21)

	£	*s.*	*d.*
8)19	13	8	
Ans.	2	9	$2\frac{1}{2}$

(22)

	£	*s.*	*d.*	*far.*
10)8	6	2	2	
Ans.	0	16	7	$1\frac{8}{10}$

(23)

£ *s.* *d.* *far.*
12 14 5 3
20
35)254(7
245
9
12
35)113(3
105
8
4
35)35(1
35
Ans. 7*s.* $3\frac{1}{4}$*d.*

(24)

£ *s.* *d.*
23 12 6
20
84)472(5
420
52
12
84)630(7
588
42
4
84)168(2
168
Ans. 5*s.* $7\frac{1}{2}$*d.*

(25)

	mi.	*fur.*	*rd.*
12)246	6	36	
Ans.	20	4	23

(26)

mi.
15)3176(211
30
17
15
26
15
11
8
15)88(5
75
13
40
15)520(34
45
70
60
10
5½
15)55(3
45
10
3
15)30(2
30

Ans. 211*mi.* 5*fur.* 34*rd.* 3*ft.* 2*in.*

(28)

mi.
34)240000(7058
238
200
170
300
272
28
60
34)1680(49
136
320
306
14
60
34)840(24
68
160
136
24

Ans. 7058*hr.* 49*m.* 24$\frac{24}{34}$*sec.*

(27)

mi.
224)12000(53
1120
800
672
128
24
512
256
224)3072(13
224
832
672
160
60
224)9600(42
896
640
448
192
60
224)11520(51
1120
320
224
96

Ans. 53*da.* 13*hr.* 42*m.* 51*sec.*

(29)

° ′ ″
20)25 42 40
Ans. 2 34 16

(30)

£ s.
56 8
20
96)1128(11
96
168
96
72
12
96)864(9
864

Ans. 11*s.* 9*d.*

(31)

lb. *oz.*
8)201 12

Ans. 25*lb.* 3*oz.* 8*dr.*

(32)

da.
102)366(3
306
60
24
102)1440(14
102
420
408
12
60
102)720(7
714
6
60
102)360(3
306
54

Ans. 3*da.* 14*hr.* 7*m.* $3\frac{54}{102}$ *sec.*

(33)

da. *hr.*
102)365 6(3
306
59
24
242
118
102)1422(13
102
402
306
96
60
102)5760(56
510
660
612
48
60
102)2880(28
204
840
816
24

Ans. 3*da.* 13*hr.* 56*m.* $28\frac{24}{102}$ *sec.*

(34)

T.	cwt.	
15)35	5(2	
30		
5		
20		
15)105(7		
105		
Ans.	2*T.* 7*cwt.*	

(35)

bu.	pk.	
270)371	1(1	
270		
101		
4		
270)405(1		
270		
135		
8		
270)1080(4		
1080		
Ans.	1*bu.* 1*pk.* 4*qt.*	

APPLICATIONS IN THE FOUR RULES.

(1)

	£	s.	d.		£	s.	d.
3*lb.* of green tea, - -	at 0	7	6	*per pound.*	1	2	6
27*yd.* of muslin, - -	at 0	1	6	*per yard.*	2	0	6
4*cwt.* of sugar, - -	at 2	2	8	*per cwt.*	8	10	8
2*hhd.* of molasses, -	at 0	2	6	*per gal.*	15	15	0
6*lb.* of raisins, - - -	at 0	1	7	*per pound.*	0	9	6
				Ans.	£27	18	2

(2)

	oz.	pwt.	gr.	lb.	oz.	pwt.
2*doz.* silver spoons, each weighing	3	4	1	6	4	17
2*doz.* " teaspoons, "	0	15	16	1	6	16
3 " tankards, "	22	14	0	5	8	2
				13	7	15
Old silver,				6	10	3
Ans.				6	9	12

(3)

£	s.	d.
2	1	10
		11
23	0	2
		2
46	0	4

Ans.

(4)

63=7×9

£	s.	d.
2)67	4	0
7)33	12	0
9)4	16	0
0	10	8

Ans.

(5)

£	cwt.
14	4
20	4
280	16
12	25
4\|00)33\|60	80
8 . . . 160	32
4	400
4\|00)6\|40	
1 . . . 240	

Ans. 8*d.* $1\frac{240}{400}$ *far.*

(6)

		£	s.
64	at	67	4
30	at	29	16
34		34)37	8(1
		34	
		3	
		20	
		34)68(2	
		68	

Ans. £1 2*s.*

(7)

16)336(21 *sheets for each book.*

32	
16	
16	

18)437(24

36	
77	
72	
5	

	21
	500
24)10500(437	
	96
	90
	72
	180
	168
	12

Ans. 24 *reams* 5 *quires* 12 *sheets.*

(8)

gal.	*qt.*	*pt.*	*gi.*
0	0	1	3
			12
2	2	1	0

gal.
5
6
30 *gal.*

gal.	*qt.*	*pt.*	*gi.*
0	1	0	2
			36
11	1	0	0

	gal.	*qt.*	*pt.*
	2	2	1
	30	0	0
	11	1	0
drawn off	43	3	1

gal.	*qt.*	*pt.*
126	0	0
43	3	1
Ans. 82	0	1

(9)

£	*s.*
5	8
	4
21	12
50	
71	12

£	*s.*	*d.*
136	6	8
71	12	0
Ans. 63	14	8

(10)

	T.	*cwt.*	*qr.*	*lb.*
6)6	8	2	14	
Ans.	1	1	1	19

(11)

£	*s.*	*d.*	
2000	0	0	
2803	17	4	
8)4803	17	4	
Ans. 600	9	8	*widow's portion.*

£	*s.*	*d.*	
4803	17	4	
600	9	8	
4)4203	7	8	
Ans. 1050	16	11	*each child's portion.*

OF VULGAR OR COMMON FRACTIONS.

PROPOSITION I.

(1) $\frac{3}{8}$ multiplied by 8 is equal to $\frac{3}{8}\times 8 = \frac{24}{8}$.

(2) $\frac{7}{5}$ multiplied by 5 is equal to $\frac{7}{5}\times 5 = \frac{35}{5}$.

(3) $\frac{1}{7}$ multiplied by 9 is equal to $\frac{1}{7}\times 9 = \frac{9}{7}$.

(4) $\frac{8}{19}$ multiplied by 14 is equal to $\frac{8}{19}\times 14=\frac{112}{19}$.

(5) $\frac{7}{6}$ multiplied by 20 is equal to $\frac{7}{6}\times 20=\frac{140}{6}$.

(6) $\frac{167}{81}$ multiplied by 25 is equal to $\frac{167}{81}\times 25=\frac{4175}{81}$.

PROPOSITION II.

(1) $\frac{28}{15}$ divided by 2 is equal to $^{2)}\frac{28}{15}=\frac{14}{15}$.
$\frac{28}{15}$ divided by 7 is equal to $^{7)}\frac{28}{15}=\frac{4}{15}$.
$\frac{28}{15}$ divided by 14 is equal to $^{14)}\frac{28}{15}=\frac{2}{15}$.

(2) $\frac{112}{160}$ divided by 56 is equal to $^{56)}\frac{112}{160}=\frac{2}{160}$.
$\frac{112}{160}$ divided by 28 is equal to $^{28)}\frac{112}{160}=\frac{4}{160}$.
$\frac{112}{160}$ divided by 14 is equal to $^{14)}\frac{112}{160}=\frac{8}{160}$.
$\frac{112}{160}$ divided by 7 is equal to $^{7)}\frac{112}{160}=\frac{16}{160}$.

(3) $\frac{400}{117}$ divided by 25 is equal to $^{25)}\frac{400}{117}=\frac{16}{117}$.
$\frac{400}{117}$ divided by 8 is equal to $^{8)}\frac{400}{117}=\frac{50}{117}$.
$\frac{400}{117}$ divided by 16 is equal to $^{16)}\frac{400}{117}=\frac{25}{117}$.
$\frac{400}{117}$ divided by 4 is equal to $^{4)}\frac{400}{117}=\frac{100}{117}$.

PROPOSITION III.

(1) One-half of one-fourth is equal to $\frac{1}{4\times 2}=\frac{1}{8}$.

(2) One-fifth of three-sevenths is equal to $\frac{3}{7\times 5}=\frac{3}{35}$.

(3) $\frac{3}{16}$ divided by 4 is equal to $\frac{3}{16\times 4}=\frac{3}{64}$.

(4) $\frac{17}{15}$ divided by 8 is equal to $\frac{17}{15\times 8}=\frac{17}{120}$.

(5) $\frac{16}{175}$ divided by 45 is equal to $\frac{16}{175\times 45}=\frac{16}{7875}$.

PROPOSITION IV.

(1) $\frac{3}{4}$ multiplied by 2 is equal to $_{2)}\frac{3}{4}=\frac{3}{2}$.
$\frac{3}{4}$ multiplied by 4 is equal to $_{4)}\frac{3}{4}=\frac{3}{1}$.

(2) $\frac{16}{32}$ multiplied by 2 is equal to $_{2)}\frac{16}{32}=\frac{16}{16}$.
$\frac{16}{32}$ multiplied by 4 is equal to $_{4)}\frac{16}{32}=\frac{16}{8}$.
$\frac{16}{32}$ multiplied by 8 is equal to $_{8)}\frac{16}{32}=\frac{16}{4}$.
$\frac{16}{32}$ multiplied by 16 is equal to $_{16)}\frac{16}{32}=\frac{16}{2}$.
$\frac{16}{32}$ multiplied by 32 is equal to $_{32)}\frac{16}{32}=\frac{16}{1}$.

(3) $\frac{8}{48}$ multiplied by 2 is equal to $_{2)}\frac{8}{48}=\frac{8}{24}$.
$\frac{8}{48}$ multiplied by 4 is equal to $_{4)}\frac{8}{48}=\frac{8}{12}$.
$\frac{8}{48}$ multiplied by 6 is equal to $_{6)}\frac{8}{48}=\frac{8}{8}$.
$\frac{8}{48}$ multiplied by 8 is equal to $_{8)}\frac{8}{48}=\frac{8}{6}$.
$\frac{8}{48}$ multiplied by 12 is equal to $_{12)}\frac{8}{48}=\frac{8}{4}$.
$\frac{8}{48}$ multiplied by 16 is equal to $_{16)}\frac{8}{48}=\frac{8}{3}$.
$\frac{8}{48}$ multiplied by 24 is equal to $_{24)}\frac{8}{48}=\frac{8}{2}$.
$\frac{8}{48}$ multiplied by 48 is equal to $_{48)}\frac{8}{48}=\frac{8}{1}$.

(4) $\frac{19}{84}$ multiplied by 2 is equal to $_{2)}\frac{19}{84}=\frac{19}{42}$.
$\frac{19}{84}$ multiplied by 4 is equal to $_{4)}\frac{19}{84}=\frac{19}{21}$.
$\frac{19}{84}$ multiplied by 6 is equal to $_{6)}\frac{19}{84}=\frac{19}{14}$.
$\frac{19}{84}$ multiplied by 12 is equal to $_{12)}\frac{19}{84}=\frac{19}{7}$.
$\frac{19}{84}$ multiplied by 21 is equal to $_{21)}\frac{19}{84}=\frac{19}{4}$.
$\frac{19}{84}$ multiplied by 42 is equal to $_{42)}\frac{19}{84}=\frac{19}{2}$.

(5) $\frac{151}{200}$ multiplied by 5 is equal to $_{5)}\frac{151}{200}=\frac{151}{40}$.
$\frac{151}{200}$ multiplied by 10 is equal to $_{10)}\frac{151}{200}=\frac{151}{20}$.
$\frac{151}{200}$ multiplied by 20 is equal to $_{20)}\frac{151}{200}=\frac{151}{10}$.

PROPOSITION V.

(1) Both terms of $\frac{5}{7}$ multiplied by 7 gives $\frac{5\times7}{7\times7}=\frac{35}{49}$.

(2)

$$\frac{19\times3}{12\times3}=\frac{57}{36}. \qquad \frac{19\times9}{12\times9}=\frac{171}{108}.$$

$$\frac{19\times4}{12\times4}=\frac{76}{48}. \qquad \frac{19\times12}{12\times12}=\frac{228}{144}.$$

$$\frac{19\times5}{12\times5}=\frac{95}{60}. \qquad \frac{19\times15}{12\times15}=\frac{285}{180}.$$

$$\frac{19\times6}{12\times6}=\frac{144}{72}. \qquad \frac{19\times20}{12\times20}=\frac{380}{240}.$$

(3)

$$\frac{125\times7}{102\times7}=\frac{875}{714}. \qquad \frac{125\times15}{102\times15}=\frac{1875}{1530}.$$

$$\frac{125\times8}{102\times8}=\frac{1000}{816}. \qquad \frac{125\times17}{102\times17}=\frac{2125}{1734}.$$

$$\frac{125\times12}{102\times12}=\frac{1500}{1224}. \qquad \frac{125\times45}{102\times45}=\frac{5625}{4590}.$$

$$\frac{125\times14}{102\times14}=\frac{1750}{1428}. \qquad \frac{125\times20}{102\times20}=\frac{2500}{2040}.$$

PROPOSITION VI.

(3) $\frac{32}{128}$ each term divided by 2 gives $\frac{2)32}{2)128}=\frac{16}{64}$.

$\frac{32}{128}$ each term divided by 4 gives $\frac{4)32}{4)128}=\frac{8}{32}$.

$\frac{32}{128}$ each term divided by 8 gives $\frac{8)32}{8)128}=\frac{4}{16}$.

$\frac{32}{128}$ each term divided by 16 gives $\frac{16)32}{16)128}=\frac{2}{8}$.

$\frac{32}{128}$ each term divided by 32 gives $\frac{32)32}{32)128}=\frac{1}{4}$.

(4) $\frac{60}{180}$ each term divided by 2 gives $\frac{2)60}{2)180}=\frac{30}{90}$.

$\frac{60}{180}$ each term divided by 3 gives $\frac{3)60}{3)180}=\frac{20}{60}$.

$\frac{60}{180}$ each term divided by 4 gives $\frac{4)60}{4)180}=\frac{15}{45}$.

$\frac{60}{180}$ each term divided by 5 gives $\frac{5)60}{5)180}=\frac{12}{36}$.

$\frac{60}{180}$ each term divided by 6 gives $\frac{6)60}{6)180}=\frac{10}{30}$.

$\frac{60}{180}$ each term divided by 10 gives $\frac{10)60}{10)180}=\frac{6}{18}$.

$\frac{60}{180}$ each term divided by 12 gives $\frac{12)60}{12)180}=\frac{5}{15}$.

$\frac{60}{180}$ each term divided by 15 gives $\frac{15)60}{15)180}=\frac{4}{12}$.

$\frac{60}{180}$ each term divided by 20 gives $\frac{20)60}{20)180}=\frac{3}{9}$.

$\frac{60}{180}$ each term divided by 30 gives $\frac{30)60}{30)180}=\frac{2}{6}$.

$\frac{60}{180}$ each term divided by 60 gives $\frac{60)60}{60)180}=\frac{1}{3}$.

GREATEST COMMON DIVISOR.

(1)

)740(1
408
332)408(1
332
76)332(4
304
28)76(2
56
20)28(1
20
8)20(2
16
4)8
2
10

(2)

315)810(2
630
180)315(1
180
135)180(1
135
45)135(3
135
Ans. 45

Ans. 4.

(3)

4410)5670(1
4410
1260)4410(3
3780
630)1260(2
1260
Ans. 630

(4)

1869)3471(1
1869
1602)1869(1
1602
267)1602(6
1602
Ans. 267

(5)

1584)2772(1
1584
1188)1584(1
1188
396)1188(3
1188
Ans. 396

(6)

492)744(1
492
252)492(1
252
240)252(1
240
12)240
20

12)1044
87
Ans. 12

(7)

944)1488(1
944
544)944(1
544
400)544(1
400
144)400(2
288
112)144(1
112
32)112(3
96
16)32(2
32

16)2088(130
16
48
48
8)16
2
Ans. 8

(8)

216)408(1
216
192)216(1
192
24)192(8
192

24)740(30
72
20)24(1
20
4)20
5

Ans. 4.

(9)

945)1560(1
945
615)945(1
615
330)615(1
330
285)330(1
285
45)285(6
270
15)45(3
45

15)22683(1512
15
76
75
18
15
33
30
3)15
5

Ans. 3.

(10)

204)1190(5
1020
170)204(1
170
34)170(5
170

34)1445(42
136
85
68
17

Ans. 17.

17)2006(118
17
30
17
136
136

LEAST COMMON MULTIPLE.

(3)

2)6 . . . 7 . . . 8 . . . 10
3 . . . 7 . . . 4 . . . 5

$3\times7\times4\times5\times2=840$ *Ans.*

(4)

7)21 . . . 49
3 . . . 7

$3\times7\times7=147$ Ans.

(5)

2)2 . . . 7 . . . 5 . . . 6 . . . 8

1 . . . 7 . . . 5 . . . 3 . . . 4

$1\times7\times5\times3\times4\times2=840$ *Ans.*

(6)

7)4 . . . 14 . . . 28 . . . 98

2)4 . . . 2 . . . 4 . . . 14

2)2 . . . 1 . . . 2 . . . 7

1 . . . 1 . . . 1 . . . 7

$1\times1\times1\times7\times2\times2\times7=196$ *Ans.*

(7)

13 6

$13\times6=78$ *Ans.*

(8)

4)12 . . . 4 . . . 7

3 . . . 1 . . . 7

$3\times1\times7\times4=84$ *Ans.*

(9)

2)6 . . . 9 . . . 4 . . . 14 . . . 16

3)3 . . . 9 . . . 2 . . . 7 . . . 8

2)1 . . . 3 . . . 2 . . . 7 . . . 8

1 . . . 3 . . . 1 . . . 7 . . . 4

$1\times3\times1\times7\times4\times2\times3\times2=1008$ *Ans.*

(10)

4)13 . . . 12 . . . 4

13 . . . 3 . . . 1

$13\times3\times1\times4=156$ *Ans.*

(11)

7)11 . . . 17 . . . 19 . . . 21 . . . 7

11 . . . 17 . . . 19 . . . 3 . . . 1

$11\times17\times19\times3\times7=74613$ Ans.

REDUCTION OF VULGAR FRACTIONS.

CASE I.

(2)

$\frac{99}{8}=8)99=12\frac{3}{8}$

(3)

$\frac{19}{7}=7)19=2\frac{5}{7}$

(4)

$\frac{51}{9}=9)51=5\frac{6}{9}$

(5)

$\frac{15}{3}=3)15=5$

(6)

125)327(2 *Ans.* $2\frac{77}{125}$.
250
77

153)3672(24 *Ans.* 24.
306
612
612

6941)50287(7
48587 *A.* $7\frac{1700}{6941}$.
1700

72301)987625(13
72301 *A.* $13\frac{47712}{72301}$.
264615
216903
47712

(7)

$\frac{878}{4}=4)878=219\frac{2}{4}$

(8)

3114)62587(20
6228 *Ans.* $20\frac{307}{3114}$.
307

109)4927(45
436 *Ans.* $45\frac{22}{109}$.
567
545
22

278436)2641674(9 *Ans.* $9\frac{135750}{278436}$.
2505924
135750

(9)

4674)147254149(31504 7803)62015735(7947 •
14022 *A.* $31504\frac{4453}{4674}$. 54621 *A.* $7947\frac{5294}{7803}$.
7034 73947
4674 70227
23601 37203
23370 31212
23149 59915
18696 54621
4453 5294

108)145260(1345 *Ans.*
108
372
324
486
432
540
540

CASE II.

(2)

$$47\tfrac{5}{6}=\tfrac{47\times6+5}{6}=\tfrac{287}{6}.$$

(3)

$$676\tfrac{37}{51}=\tfrac{676\times51+37}{51}=\tfrac{34513}{51}.$$

$$874\tfrac{33}{9}=\tfrac{874\times9+33}{9}=\tfrac{7899}{9}.$$

$$690\tfrac{47}{100}=\tfrac{690\times100+47}{100}=\tfrac{69047}{100}.$$

$$367\tfrac{9}{104}=\tfrac{367\times104+9}{104}=\tfrac{38177}{104}.$$

(4)

$$847\tfrac{36}{175}=\tfrac{847\times175+36}{175}=\tfrac{148261}{175}.$$

$$874\tfrac{876}{104}=\tfrac{874\times104+876}{104}=\tfrac{91772}{104}.$$

$$67426\tfrac{368}{879}=\tfrac{67426\times879+368}{879}=\tfrac{59267822}{879}.$$

(5) $675\times100+187=135187$.

(6) $187\times151+41=28278$.

(7)

$$625\tfrac{4}{13}=\tfrac{625\times13+4}{13}=\tfrac{8129}{13}.$$

(8)

$$156\tfrac{17}{407}=\tfrac{156\times407+17}{407}=\tfrac{63509}{407}.$$

CASE III.

(2) Greatest com. divisor 104; hence, $\frac{104)104}{104)312}=\frac{1}{3}$.

(3) Greatest com. divisor 1049; hence, $\frac{1049)1049}{1049)8392}=\frac{1}{8}$.

(4) Greatest com. divisor 55; hence, $\frac{55)275}{55)440}=\frac{5}{8}$.

(5) Greatest com. divisor 3; hence, $\frac{3)351}{3)795}=\frac{117}{265}$.

(6) Greatest com. divisor 86; hence, $\frac{86)172}{86)1118}=\frac{2}{13}$.

(7) Greatest com. divisor 9; hence, $\frac{9)63}{9)81}=\frac{7}{9}$.

(8) Greatest com. divisor 45; hence, $\frac{45)315}{45)405}=\frac{7}{9}$.

(9) Greatest com. divisor 89; hence, $\frac{89)1157}{89)623}=\frac{13}{7}$.

(10) Greatest com. divisor 198; hence, $\frac{198)792}{198)1386}=\frac{4}{7}$.

CASE IV.

(2) $15\times9=135$; hence, $\frac{135}{9}=Ans.$

(3) $139\times175=24325$; hence, $\frac{24325}{175}=Ans.$

(4) $1837\times181=332497$; hence, $\frac{332497}{181}=Ans.$

(5)

$327\times837=273699$; hence, 1st fraction is $\frac{273699}{837}$.

$889\times837=744093$; hence, 2d fraction is $\frac{744093}{837}$.

$575\times837=481275$; hence, 3d fraction is $\frac{481275}{837}$.

(6)

$876\times216=189216$; hence, 1st fraction is $\frac{189216}{216}$.

$306\times216=66096$; hence, 2d fraction is $\frac{66096}{216}$.

$5047\times216=1090152$; hence, 3d fraction is $\frac{1090152}{216}$.

CASE V.

(4) $\frac{6}{8}\times\frac{8}{9}\times\frac{9}{15}=\frac{432}{1080}=\frac{2}{5}$.

(5) $2\frac{1}{4}=\frac{9}{4}$, $6\frac{1}{2}=\frac{13}{2}$; and, $\frac{9}{4}\times\frac{13}{2}\times\frac{7}{1}=\frac{819}{8}=102\frac{3}{8}$.

(6) We have $\frac{5}{1}\times\frac{1}{2}\times\frac{1}{7}\times\frac{6}{1}=\frac{30}{14}=2\frac{1}{7}$.

(7) $6\frac{1}{3}=\frac{19}{3}$, $7\frac{1}{4}=\frac{29}{4}$; and, $6\frac{31}{27}=\frac{193}{27}$; and,
$\frac{19}{3}\times\frac{29}{4}\times\frac{193}{27}=\frac{106343}{324}=328\frac{71}{324}$.

METHOD BY CANCELLING.

(3) $\frac{3}{4}\times\frac{5}{\cancel{6}_{2}}\times\frac{5}{\cancel{9}}\times\frac{\cancel{27}^{\cancel{9}}}{101}\times\frac{5}{13}=\frac{375}{10504}$.

(4) $\frac{41}{110}\times\frac{\cancel{3}}{19}\times\frac{41}{\cancel{108}_{\cancel{36}_{12}}}\times\frac{\cancel{3}}{7}=\frac{1681}{175560}$.

(5) $3\frac{5}{8}=\frac{29}{8}$; $\frac{29}{8}\times\frac{5}{\cancel{9}}\times\frac{\cancel{27}^{3}}{\cancel{301}_{43}}\times\frac{\cancel{49}^{7}}{1}=\frac{3045}{344}=8\frac{293}{344}$.

CASE VI.

(2) $\frac{47\frac{5}{8}}{95}=\frac{\frac{381}{8}\times\frac{1}{95}}{\frac{95}{1}\times\frac{1}{95}}=\frac{381}{760}$.

(3) $\frac{34\frac{5}{7}}{84}=\frac{\frac{243}{7}\times\frac{1}{84}}{\frac{84}{1}\times\frac{1}{84}}=\frac{243}{588}=\frac{81}{196}$.

(4) $\frac{44}{147\frac{5}{9}}=\frac{\frac{44}{1}\times\frac{9}{1328}}{\frac{1328}{9}\times\frac{9}{1328}}=\frac{396}{1328}=\frac{99}{332}$.

(5) $\frac{247}{\frac{5}{7}}=\frac{\frac{247}{1}\times\frac{7}{5}}{\frac{5}{7}\times\frac{7}{5}}=\frac{1729}{5}=345\frac{4}{5}$.

(6) $\frac{\frac{147}{504}}{1789} = \frac{\frac{147}{504} \times \frac{1}{1789}}{\frac{1789}{1} \times \frac{1}{1789}} = \frac{146}{901656} = \frac{7}{42936}$.

(7) $\frac{394\frac{74}{99}}{894\frac{547}{719}} = \frac{\frac{39080}{99} \times \frac{719}{643333}}{\frac{643333}{719} \times \frac{719}{643333}} = \frac{28098520}{63689967}$.

CASE VII.

(4)

$5\frac{1}{2} = \frac{11}{2}$, $\frac{6}{7}$ of $\frac{1}{3} = \frac{2}{7}$, and $4 = \frac{4}{1}$.

$11 \times 7 \times 1 = 77$ 1st numerator.
$2 \times 2 \times 1 = 4$ 2d numerator.
$4 \times 7 \times 2 = 56$ 3d numerator.
$2 \times 7 \times 1 = 14$ denominator.

(5)

$7 \times 75 \times 1 = 525$ 1st numerator.
$135 \times 8 \times 1 = 1080$ 2d numerator.
$37 \times 75 \times 8 = 22200$ 3d numerator.
$8 \times 75 \times 1 = 600$ denominator.

(6)

$4 \times 25 \times 2 = 200$ 1st numerator.
$31 \times 1 \times 2 = 62$ 2d numerator.
$62 \times 25 \times 1 = 1550$ 3d numerator.
$1 \times 25 \times 2 = 50$ denominator.

(7)

$7\frac{1}{2} = \frac{15}{2}$, $\frac{31}{18}$, $6\frac{1}{4} = \frac{25}{4}$.

$15 \times 18 \times 4 = 1080$ 1st numerator.
$31 \times 2 \times 4 = 248$ 2d numerator.
$25 \times 18 \times 2 = 900$ 3d numerator.
$2 \times 18 \times 4 = 144$ denominator.

(8)

$4\frac{1}{9}=\frac{37}{9}$, $8\frac{1}{7}=\frac{57}{7}$, $2\frac{1}{2}$ of $5=\frac{25}{2}$.

$37\times7\times2=518$ 1st numerator.
$57\times9\times2=1026$ 2d numerator.
$25\times7\times9=1575$ 3d numerator.
$9\times7\times2=126$ denominator.

NOTE 1.—By multiplying the numerator and denominator.

(3)

Multiply the numerator and denominator of the 1st by 2, and of the 3d by 3.

(4)

Multiply the numerator and denominator of the 1st by 4, and of the 3d by 2.

(5)

Multiply the numerator and denominator of the 1st by 3, of the 2d by 4, and of the 3d by 6.

(6)

Multiply the numerator and denominator of the 1st by 2, and of the 2d by 12.

(7)

Multiply the numerator and denominator of the 1st by 6, of the 2d by 4, of the 3d by 9, and of the 4th by 4.

LEAST COMMON DENOMINATOR.

(2)

The least common multiple of the denom[illegible] is 45

$4\times\frac{45}{5}=36$, $8\times\frac{45}{9}=40$, $3\times\frac{45}{15}=9$. A[illegible], 7

(3)

$14\frac{5}{4}=\frac{61}{4}$, $6\frac{3}{8}=\frac{51}{8}$, $5\frac{1}{2}=\frac{11}{2}$; and 8 is least common multiple. Thus,

$61\times\frac{8}{4}=122$, $51\times\frac{8}{8}=51$, $11\times\frac{8}{2}=44$.

Ans. $\frac{122}{8}=15\frac{2}{8}$, $\frac{51}{8}=6\frac{3}{8}$, and $\frac{44}{8}=5\frac{4}{8}$.

(4)

$\frac{3}{15}$, $\frac{4}{24}$, $\frac{8}{9}=\frac{1}{3}$, $\frac{1}{6}$, $\frac{8}{9}$; least common multiple 90.

$1\times\frac{90}{6}=18$; $1\times\frac{90}{6}=15$; $8\times\frac{90}{9}=80$.

Ans. $\frac{18}{90}$, $\frac{15}{90}$, $\frac{80}{90}$.

(5)

$\frac{67}{120}$, $\frac{6}{40}$, $\frac{5}{2}$; least common multiple 120.

$67\times\frac{120}{120}=67$; $6\times\frac{120}{40}=18$; $5\times\frac{120}{2}=300$.

Ans. $\frac{67}{120}$, $\frac{18}{120}$, $\frac{300}{120}$.

(6)

$\frac{41}{50}$, $3\frac{61}{20}=\frac{121}{20}$, $4\frac{1}{2}=\frac{9}{2}$, $8=\frac{8}{1}$; least com. multiple 100.

$41\times\frac{100}{50}=82$, $121\times\frac{100}{20}=605$, $9\times\frac{100}{2}=450$, and $8\times\frac{100}{1}=800$.

Ans. $\frac{82}{100}$, $\frac{605}{100}$, $\frac{450}{100}$, $\frac{800}{100}$.

(7)

$3\frac{1}{8}=\frac{25}{8}$, $4\frac{4}{12}=\frac{52}{12}$, $8\frac{6}{18}=\frac{150}{18}$, $14\frac{7}{16}=\frac{231}{16}$; least denominator 144.

$25\times\frac{144}{8}=450$, $52\times\frac{144}{12}=624$, $150\times\frac{144}{18}=1200$, and $231\times\frac{144}{16}=2079$.

Ans. $\frac{450}{144}$, $\frac{624}{144}$, $\frac{1200}{144}$, $\frac{2079}{144}$.

(8)

$\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$; the least common multiple is 12.

$1\times\frac{12}{2}=6$, $2\times\frac{12}{3}=8$, $3\times\frac{12}{4}=9$, $5\times\frac{12}{6}=10$.

Ans. $\frac{6}{12}$, $\frac{8}{12}$, $\frac{9}{12}$, $\frac{10}{12}$.

(9)

$\frac{2}{5}$, $\frac{4}{6}$, $\frac{5}{9}$, $\frac{7}{10}$; the least common multiple is 90.

$2\times\frac{90}{5}=36$, $4\times\frac{90}{6}=60$, $5\times\frac{90}{9}=50$, $7\times\frac{90}{10}=63$.

Ans. $\frac{36}{90}$, $\frac{60}{90}$, $\frac{50}{90}$, $\frac{63}{90}$.

(10)

$\frac{1}{3}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{7}{8}$, $\frac{11}{16}$, $\frac{17}{24}$; the least common multiple is 48.

$1\times\frac{48}{3}=16$, $3\times\frac{48}{4}=36$, $5\times\frac{48}{6}=40$, $7\times\frac{48}{8}=42$, and $11\times\frac{48}{16}=33$, $17\times\frac{48}{24}=34$.

Ans. $\frac{16}{48}$, $\frac{36}{48}$, $\frac{40}{48}$, $\frac{42}{48}$, $\frac{33}{48}$, $\frac{34}{48}$.

EXAMPLES IN REDUCTION OF FRACTIONS.

(1)

$\frac{57)57}{57)456}=\frac{1}{8}$. *Ans.*

(2)

$\frac{1429)1429}{1429)2858}=\frac{1}{2}$. *Ans.*

(3)

$\frac{329)3619}{329)6251}=\frac{11}{19}$. *Ans.*

(4)

$\frac{4)468}{4)1184}=\frac{117}{296}$. *Ans.*

(5)

$\frac{432)1296}{432)3024}=\frac{3}{7}$. *Ans.*

(6)

$\frac{617)617}{617)4319}=\frac{1}{7}$. *Ans.*

(7)

$\frac{3)128}{3)456}=\frac{41}{152}$. *Ans.*

(8)

$45\frac{7}{8}=\frac{367}{8}$. *Ans.*

(9)

$16\frac{18}{100}=\frac{1618}{100}$. *Ans.*

(10)

$149\frac{116}{137}=\frac{20529}{137}$. *Ans.*

(11)

$12410\frac{}{19}=653\frac{3}{19}$. *Ans.*

(12)

$\frac{67856}{7}=9693\frac{5}{7}$. *Ans.*

(13)

$\frac{22085}{360}=61\frac{125}{360}$. *Ans.*

(14)

$\frac{354}{16}=19\frac{7}{8}$. Ans.

(15)

$\frac{1}{2}$ of $\frac{3}{4}$ of $\frac{1}{8}$ of $\frac{7}{8}$ of $\frac{1}{3}=\frac{7}{512}$. *Ans.*

(16)

$\frac{6}{11}$ of $\frac{6}{7}$ of $\frac{1}{4}$ of $21=2\frac{5}{11}$. *Ans.*

(17)

$\frac{1}{3}$ of $\frac{3}{4}$ of $\frac{4}{5}$ of $\frac{5}{6}$ of $\frac{6}{7}$ of $\frac{40}{1}=5\frac{5}{7}$. *Ans.*

(18)

$\frac{8}{11}$ of $\frac{3}{3}=\frac{16}{33}$. *Ans.*

(19)

$\frac{3}{5}$ of $\frac{19}{23}$ of $\frac{265}{1}=131\frac{8}{23}$. *Ans.*

(20)

$\frac{7}{11}$ of $15\frac{7}{8}$ of $5\frac{7}{10}$ of $100=5758\frac{13}{44}$. *Ans.*

(21)

$\frac{2}{9}$, $\frac{7}{1}$, $\frac{8}{1}$, $\frac{36}{7}=\frac{14}{63}$, $\frac{441}{63}$, $\frac{504}{63}$, $\frac{324}{63}$. *Ans.*

(22)

$\frac{3}{4}$, $\frac{7}{8}$, $\frac{1}{6}$, $\frac{19}{5}=\frac{90}{120}$, $\frac{105}{120}$, $\frac{20}{120}$, $\frac{456}{120}$. *Ans.*

(23)

$\frac{3}{4}$, $\frac{5}{8}$, $\frac{37}{3}=\frac{54}{72}$, $\frac{60}{72}$, $\frac{888}{72}$. *Ans.*

(24)

$\frac{2}{9}$, $\frac{3}{4}$, $\frac{55}{96}=\frac{768}{3456}$, $\frac{2592}{3456}$, $\frac{1980}{3456}$. *Ans.*

(25)

$\frac{1}{2}$ of $\frac{2}{3}$ of $2=\frac{2}{3}$; $\frac{3}{4}$ of $\frac{4}{5}$ of $8\frac{1}{2}=\frac{51}{10}$; $\frac{3}{5}$ of $9\frac{1}{3}=\frac{28}{5}$.

hen, $\frac{2}{3}$, $\frac{51}{10}$, $\frac{28}{5}=\frac{20}{30}$, $\frac{153}{30}$, $\frac{168}{30}$. Ans.

(26)

$\frac{1}{2}$ of 2 of $\frac{1}{3}$ of 3 of $\frac{1}{4}$ of 4=1,
$\frac{1}{5}$ of 5 of $\frac{1}{6}$ of $6\frac{1}{2}$ of $\frac{1}{9}$ of 8=$\frac{26}{27}$,
$\frac{3}{5}$ of $2\frac{1}{2}$ of $3\frac{1}{2}$ of $\frac{1}{4}$=$\frac{21}{16}$.

Then, $\frac{1}{1}$, $\frac{26}{27}$, $\frac{21}{16}=\frac{432}{432}$, $\frac{416}{432}$, $\frac{567}{432}$. *Ans.*

REDUCTION OF DENOMINATE FRACTION

CASE I.

(3)

$\frac{3}{4}oz.=\frac{3}{4}$ of $\frac{1}{16}lb.$ of $\frac{1}{25}qr.$ of $\frac{1}{4}cwt.$ of $\frac{1}{20}T.=$ 1

(4)

$\frac{5}{9}pt.=\frac{5}{9}$ of $\frac{1}{2}qt.$ of $\frac{1}{4}gal.$ of $\frac{1}{63}hhd.=\frac{5}{45360}hhd.$

(5)

$\frac{1}{3}far.=\frac{1}{3}$ of $\frac{1}{4}d.$ of $\frac{1}{12}s.$ of $\frac{1}{20}£=\frac{1}{2880}£.$ *Ans.*

(6)

$\frac{3}{80}gal.=\frac{3}{8}$ of $\frac{1}{63}hhd.=\frac{3}{504}hhd.$ *Ans.*

(7)

$\frac{5}{8}s.=\frac{5}{8}$ of $\frac{1}{20}£=\frac{5}{160}£.$ *Ans*

(8)

$\frac{187}{127}m.=\frac{187}{127}$ of $\frac{1}{60}hr.$ of $\frac{1}{24}da.=\frac{187}{182880}da.$ *Ans*

(9)

$\frac{6}{8}lb.=\frac{6}{8}$ of $\frac{1}{25}qr.$ of $\frac{1}{4}cwt.=\frac{3}{400}cwt.$ *Ans.*

(10)

$\frac{1}{2}oz.=\frac{1}{2}$ of $\frac{1}{16}lb.$ of $\frac{1}{25}$qr. of $\frac{1}{4}$cwt. of $\frac{1}{20}$T.=$\frac{1}{64}$

CASE II.

(2)

$cwt. = \frac{4}{7} cwt.$ of $\frac{4}{1} qr.$ of $\frac{25}{1} = \frac{400}{7} lb.$ *Ans.* $\frac{400}{7} lb.$

(3)

$\frac{2}{5}£ = \frac{2}{15}$ of $\frac{20}{1} s.$ of $\frac{12}{1} d. = \frac{480}{15} d. = \frac{32}{1} d.$ *Ans.* $\frac{32}{1} d.$

(4)

$\frac{1}{3} a. = \frac{1}{3}$ of $\frac{24}{1} hr.$ of $\frac{60}{1} m. = \frac{1440}{3} = 480m.$ *Ans.* 480*m.*

(5)

$A. = \frac{3}{9}$ of $\frac{4}{1} R.$ of $\frac{40}{1} P. = \frac{480}{9} P.$ *Ans.* $\frac{480}{9} P.$

(6)

$£ = \frac{6}{7}$ of $\frac{20}{1} s.$ of $\frac{12}{1} d.$ of $\frac{4}{1} far. = \frac{5760}{7} far.$ *Ans.*

(7)

$\frac{1}{64} hhd. = \frac{3}{504}$ of $\frac{63}{1} gal. = \frac{189}{504} = \frac{3}{8} gal.$ *Ans.* $\frac{3}{8} gal.$

(8)

$\frac{1}{5} bu. = \frac{4}{10}$ of $\frac{4}{1} pk.$ of $\frac{8}{1} qt.$ of $\frac{2}{1} pt. = \frac{256}{10} pt.$ *Ans.*

CASE III.

(2)

4
12
5)48(9*oz.*
45
3
20
5)60(12*pwt.*
60
Ans. 9*oz.* 12*pwt.*

(3)

5
4
16)20(1*qr.*
16
4
25
16)100(6*lb.*
96
4
Ans. 1*qr.* 6¼*lb.*

(4)

5
4
8)20(2*R.*
16
4
40
8)160(20*P.*
160 *Ans.* 2*R.* 20*P.*

(5)

1
20
6)20(3*s.*
18
2
12
6)24(4*d.*
24 *Ans.*

(6)

5
63
6)315(52*gal.*
30
15
12
3
4
6)12(2*qt.*
12
Ans. 52*gal.* 2*qt.*

(7)

196
63
588
1176
504)12348(24*gal.*
1008
2268
2016
252
4
504)1008(2*qt.*
1008
Ans. 24*gal.* 2*q*

(8)

21
2
9)42
4*s.* . . . 6
12
9)72
8*d.*
Ans. 4*s.* 8*d.*

(9)

3
12
5)36
7*oz.* . . . 1
2(
5)2(
4
Ans. 7(

(10)

$$\begin{array}{r} 7 \\ 4 \\ \hline 8)28 \\ \hline 3hhd. \ldots 4 \\ 63 \\ \hline 8)252 \\ \hline 31gal. \ldots 4 \\ 4 \\ \hline 8)16 \\ \hline 2qt. \end{array}$$

Ans. 3*hhd.* 31*gal.* 2*qt.*

CASE IV.

(3)

2 *feet*$=2\times12=24$ *inches.*

$+2$

26 *inches.*

26 of $\frac{1}{12}$ of $\frac{1}{3}=\frac{13}{18}yd.$

(4)

3*gal.* 2*qt.*$=14$ *quarts.*

14 of $\frac{1}{4}$ of $\frac{1}{63}=\frac{1}{18}hhd.$

(5)

1*qr.* 7*lb.*$=32lb.$

32 of $\frac{16}{1}$ of $\frac{16}{1}=8192dr.$

(6)

3*qt.* 1*pt.*$=7pt.$

8 of $\frac{1}{2}$ of $\frac{1}{4}$ of $\frac{1}{63}=\frac{1}{72}.$

(7)

6*ft.* *in.*$=79$in.

79 of $\frac{1}{12}$ of $\frac{1}{3}$ of $\frac{1}{1760}=\frac{79}{63360}$mi.

(4)

5
4
8)20(2*R.*
16
4
40
8)160(20*P.*
160 *Ans.* 2*R.* 20*P.*

(5)

1
20
6)20(3*s.*
18
2
12
6)24(4*d.*
24 *Ans.* 3*s.* 4*d.*

(6)

5
63
6)315(52*gal.*
30
15
12
3
4
6)12(2*qt.*
12
Ans. 52*gal.* 2*qt.*

(7)

196
63
588
1176
504)12348(24*gal.*
1008
2268
2016
252
4
504)1008(2*qt.*
1008
Ans. 24*gal.* 2*qt.*

(8)

21
2
9)42
4*s.* 6
12
9)72
8*d.*
Ans. 4*s.* 8*d.*

(9)

3
12
5)36
7*oz.* . . . 1
20
5)20
4*pwt.*
Ans. 7*oz.* 4*pwt.*

(10)

7
4
8)28
3*hhd.* . . . 4
63
8)252
31*gal.* . . . 4
4
8)16
2*qt.*

Ans. 3*hhd.* 31*gal.* 2*qt.*

CASE IV.

(3)

2 *feet*$=2\times12=24$ *inches.*
$+2$
26 *inches.*

26 of $\frac{1}{12}$ of $\frac{1}{3}=\frac{13}{18}$*yd.*

(4)

3*gal.* 2*qt.*$=14$ *quarts.*
14 of $\frac{1}{4}$ of $\frac{1}{63}=\frac{1}{18}$*hhd.*

(5)

1*qr.* 7*lb.*$=32$*lb.*
32 of $\frac{16}{1}$ of $\frac{16}{1}=8192$*dr.*

(6)

3*qt.* 1*pt.*$=7$*pt.*
8 of $\frac{1}{2}$ of $\frac{1}{4}$ of $\frac{1}{63}=\frac{1}{72}$.

(7)

6*ft.* *in.*$=79$*in.*
79 of $\frac{1}{12}$ of $\frac{1}{5}$ of $\frac{1}{1760}=\frac{79}{63360}$mi.

(8)

1 of $\frac{1}{12}$ of $\frac{1}{3}$ of $\frac{1}{1760}=\frac{1}{63360}$*mi.*

(9)

1*hr.* 1*m.* 1*sec.*=3661*sec.*

3661 of $\frac{1}{60}$ of $\frac{1}{60}$ of $\frac{1}{24}$ of $\frac{1}{30}=\frac{3661}{25920000}$*da.*

(10)

3*hr.* 3*m.*=183*m.*

183 of $\frac{1}{60}$ of $\frac{1}{24}=\frac{183}{1440}$*da.*

(11)

3*hr.* 3*m.*=$\frac{183}{1440}$ of one day.

$\frac{183}{1440}\div 2=\frac{183}{2880}$ of two days.

$\frac{183}{1440}\div 3=\frac{183}{4320}$ of three days.

$\frac{183}{1440}\div 4=\frac{183}{5760}$ of four days.

$\frac{183}{1440}\div 10=\frac{183}{14400}$ of ten days.

$\frac{183}{1440}\div 25=\frac{183}{36000}$ of twenty-five days.

EXAMPLES IN REDUCTION.

(1)

$\frac{2}{5}$ of $\frac{1}{25}$ of $\frac{1}{4}=\frac{2}{225}$*cwt. Ans.*

(2)

$\frac{1}{224}$ of $\frac{1}{24}$ of $\frac{1}{7}=\frac{1}{37632}$*wk. Ans.*

(3)

$\frac{3}{4}$ of $\frac{1}{2}$ of $\frac{1}{4}$ of $\frac{1}{63}=\frac{1}{672}$*hhd. Ans.*

(4)

$5\frac{1}{2}=\frac{11}{2}$: $\frac{11}{2}$ of $\frac{1}{8}=\frac{11}{16}$*mi. Ans.*

(5)

$\frac{3}{4}$ of $\frac{1}{25}$ of $\frac{1}{4}$ of $\frac{1}{20}=\frac{3}{8000}$T. Ans.

(6)

$\frac{1}{2}$ of $\frac{1}{3}$ of $\frac{1}{[illegible]}$ of $\frac{1}{3}$ of $\frac{1}{5\frac{1}{2}}$ of $\frac{1}{40}$ of $\frac{1}{8}$ of $\frac{1}{3} = \frac{1}{1140480} L.$

(7)

$\frac{3}{4}$ of $\frac{1}{144}$ of $\frac{1}{6}$ of $\frac{1}{30\frac{1}{4}}$ of $\frac{1}{40}$ of $\frac{1}{4} = \frac{1}{8636520} A.$ *Ans.*

(8)

$\frac{1}{2}$ of $3 = \frac{3}{2}$: $\frac{3}{2}$ of $\frac{1}{25}$ of $\frac{1}{4} = \frac{3}{200}$ *cwt.* *Ans.*

(9)

$\frac{1}{3}$ of $5\frac{1}{3}$ of $6\frac{1}{4} = \frac{400}{36}$: $\frac{400}{36}$ of $\frac{1}{2}$ of $\frac{1}{4}$ of $\frac{1}{31\frac{1}{2}} = \frac{25}{567}$ *bar.*

(10)

$\frac{1}{2}$ of $\frac{1}{8}$ of $2\frac{1}{2}$ of $3\frac{1}{3} = \frac{25}{96}$: $\frac{25}{96}$ of $\frac{1}{24}$ of $\frac{1}{365\frac{1}{4}} = \frac{25}{31557600}$ *yr.*

(11)

$\frac{1}{2}$ of $2\frac{1}{3}$ of $400 = \frac{1400}{3} = 466\frac{2}{3}$ *bu.* *Ans.*

(12)

7
4
9)28
3*qr.* 1
25
9)25
2*lb.* 7
16
9)112
12*oz.* 4
16
9)64
$7\frac{1}{9}$*dr.*

Ans. 3*qr.* 2*lb.* 12*oz.* $7\frac{1}{9}$*dr.*

(13)

5
63
7)315
Ans. 45*gal.*

(20)

$$
\begin{array}{r}
7 \\
24 \\
\hline
13)168(12hr. \\
13 \\
\hline
38 \\
26 \\
\hline
12 \\
60 \\
\hline
13)720(55m. \\
65 \\
\hline
70 \\
65 \\
\hline
5 \\
60 \\
\hline
13)300(23\tfrac{1}{13}sec. \\
26 \\
\hline
40 \\
39 \\
\hline
1
\end{array}
$$

Ans. $12hr.\ 55m.\ 23\frac{1}{13}sec.$

(21)

$\frac{1}{4800}$ of $\frac{12}{1}$ of $\frac{20}{1}$ of $\frac{24}{1}=\frac{6}{5}=1\frac{1}{5}gr.$ *Ans.*

(22)

$\frac{1}{480}$ of $\frac{5}{1}$ of $\frac{4}{1}$ of $\frac{2\frac{1}{4}}{1}=\frac{1}{10}in.$ *Ans.*

(23)

$\frac{1}{576}$ of $\frac{4}{1}$ of $\frac{63}{1}$ of $\frac{4}{1}=\frac{7}{4}=1\frac{3}{4}qt.$ *Ans.*

(24)

$\frac{1}{8}$ of $1\frac{1}{4}$ of $2\frac{2}{5}=\frac{1}{1}hhd.=2016gi.$ Ans.

(25)

13*cwt.* 3*qr.* 20*lb.* = 1395*lb.*;

1395 of $\frac{1}{28}$ of $\frac{1}{4}$ of $\frac{1}{20} = \frac{279}{400}T$. *Ans.*

(26)

4*cwt.* 1*qr.* 24*lb.* = 449*lb.*;

3*cwt.* 3*qr.* 17*lb.* = 392*lb.*; $\frac{392}{449}$ *Ans.*

(27)

10*oz.* 13*pwt.* 8*gr.* = 5120*gr.*;

5120 of $\frac{1}{24}$ of $\frac{1}{20}$ of $\frac{1}{12} = \frac{8}{9}lb$. *Ans.*

(28)

19*S. ft.* 1196$\frac{4}{13}$*S. in.* = 34028$\frac{4}{13}$*S. in.* = $\frac{44236855}{5513555}$*S. in.*;

$\frac{44236855}{5513555}$ of $\frac{1}{1728}$ of $\frac{1}{128} = \frac{2}{13}C$. *Ans.*

(29)

13*fur.* 21*rd.* 18*ft.* 10*in.* 1$\frac{1}{13}$*bar.* = 1*mi.* 131953$\frac{1}{13}$*bar.* =

1*mi.* $\frac{17154009}{9913999}$*bar.* = 1$\frac{147655}{686464}$*mi.*

(30)

147*da.* 15*hr.* = 3543*hr.*;

3543 of $\frac{1}{24}$ of $\frac{1}{365\frac{1}{4}} = \frac{1181}{2922}yr$. *Ans*

(31)

27*gal.* 3*qt.* 1*pt.* = 223*pt.*;

223 of $\frac{1}{2}$ of $\frac{1}{4}$ of $\frac{1}{64} = \frac{223}{512}$ *Ans.*

ADDITION OF VULGAR FRACTIONS.

CASE I.

(2)

$1+5+9=15$; hence, sum $=£\frac{15}{7}=£2\frac{1}{7}$.

(3)

$3+4+6+13+16=42$, sum of numerators; hence,
sum $=\frac{42}{9}=\frac{14}{3}$.

(4)

$3+8+9+5+3=28$, sum of numerators; hence,
sum $=\frac{28}{14}=2$.

CASE II.

(2)

$£\frac{1}{7}$, $£\frac{2}{9}$, $£\frac{5}{6}$.

$1\times9\times6=54$ 1st numerator.
$2\times7\times6=84$ 2d numerator.
$5\times9\times7=315$ 3d numerator.
$7\times9\times6=378$ the denominator.

$54+84+315=453$; hence, sum $=£\frac{453}{378}=£1\frac{25}{126}$.

(3)

$\frac{1}{7}$, $\frac{1}{5}$, $4\frac{1}{3}=\frac{13}{3}$, and $6\frac{1}{5}=\frac{31}{5}$.

$1\times9\times3\times5=135$ 1st numerator.
$1\times7\times3\times5=105$ 2d numerator.
$13\times9\times7\times5=4095$ 3d numerator.
$31\times3\times9\times7=5859$ 4th numerator.
$7\times9\times3\times5=945$ the denominator.

$135+105+4095+5859=10194$; hence,
sum $=\frac{10194}{945}=10\frac{244}{315}$.

(4)

$\frac{1}{16}$, $\frac{3}{7}$, $\frac{2}{8}$, $\frac{4}{9}$; least common multiple is 1008.

$1 \times \frac{1008}{16} = 1 \times 63 = 63$ 1st numerator.

$3 \times \frac{1008}{7} = 3 \times 144 = 432$ 2d numerator.

$2 \times \frac{1008}{8} = 2 \times 126 = 252$ 3d numerator.

$4 \times \frac{1008}{9} = 4 \times 112 = 448$ 4th numerator.

The sum of the numerators will be,

$63+432+252+448=1195$; hence,

sum $= \frac{1195}{1008} = 1\frac{187}{1008}$.

(5)

$\frac{6}{12} = \frac{1}{2}$, $\frac{3}{5}$, $\frac{4}{8} = \frac{1}{2}$, $\frac{6}{30} = \frac{1}{5}$.

$\frac{1}{2}+\frac{1}{2}=1$; $1+\frac{3}{5}+\frac{1}{5}=1\frac{4}{5}$ *Ans.*

ART. 146.

(2)

$3\frac{1}{4}$, $6\frac{5}{7}$, $8\frac{9}{15} = 8\frac{3}{5}$, $65\frac{9}{8} = 66\frac{1}{8}$

$3+6+8+66=83=$whole numbers.

Least common multiple of the denominators is 280.

$1 \times \frac{280}{4} = 1 \times 70 = 70$ 1st numerator.

$5 \times \frac{280}{7} = 5 \times 40 = 200$ 2d numerator.

$3 \times \frac{280}{5} = 3 \times 56 = 168$ 3d numerator.

$1 \times \frac{280}{8} = 1 \times 35 = 35$ 4th numerator.

$70+200+168+35=473$.

Fractional part $= \frac{473}{280} = 1\frac{193}{280}$.

Entire sum $= 83+1\frac{193}{280} = 84\frac{193}{280}$.

CASE III.

(2)

$\frac{5}{9}$ of an inch $= \frac{5}{9}$ of $\frac{1}{12}$ of $\frac{1}{3} = \frac{5}{324}$ yards: then,

$\frac{3}{8} + \frac{5}{324} = \frac{972}{2592} + \frac{40}{2592} = \frac{1012}{2592} = \frac{4}{4}\frac{1012}{2592} = \frac{253}{648}$ *yards.*

Or, $\frac{3}{8}$ of a yard $= \frac{3}{8}$ of $\frac{12}{1} = \frac{108}{8}$ inches: then,

$\frac{5}{9} + \frac{108}{8} = \frac{40}{72} + \frac{972}{72} = \frac{1010}{72} = 14\frac{4}{72} = 14\frac{1}{18}$ *inches.*

(3)

$\frac{1}{3}$ of a week $= \frac{1}{3}$ of $\frac{7}{1} = \frac{7}{3}$ days.

$\frac{1}{2}$ of an hour $= \frac{1}{2}$ of $\frac{1}{24} = \frac{1}{48}$ days: then,

$\frac{7}{3} + \frac{1}{4} + \frac{1}{48} = \frac{112}{48} + \frac{12}{48} + \frac{1}{48} = \frac{125}{48} = 2da.\ 14\frac{1}{2}hr.$

(4)

$\frac{4}{7}cwt. = \frac{4}{7}$ of $\frac{4}{1}$ of $\frac{25}{1} = \frac{400}{7}lb. = 57\frac{1}{7}lb.$

$57\frac{1}{7} + 8\frac{5}{8} = 65 + \frac{1}{7} + \frac{5}{6}.$

$\frac{1}{7} + \frac{5}{6} = \frac{6}{42} + \frac{35}{42} = \frac{41}{42}lb.$

But, $\frac{41}{42}lb. = \frac{41}{42}$ of $\frac{16}{1} = \frac{328}{21}oz. = 15\frac{13}{21}oz.$ Finally,

$65lb. + 15\frac{13}{21}oz. + 3\frac{9}{10}oz. = 66lb.\ 3\frac{190}{210}oz. =$

$2qr.\ 16lb.\ 3\frac{190}{210}oz.$

(5)

	mi.	*fur.*	*rd.*
$1\frac{1}{4}$ miles = 1 mile 2 furlongs, - - - - -	1	2	00
$\frac{7}{10}$ furlong $= \frac{7}{10}$ of 40 = 28 rods, - - - -	0	0	28
to which add - - - - -	0	0	30
Ans.	1	3	18

ART. 148.

(2)

	yd.	*ft.*	*in.*
$\frac{2}{3}$ yard $= \frac{2}{3}$ of $\frac{3}{1} = 2$ feet, - - - - -	00	2	0
$\frac{3}{4}$ foot $= \frac{3}{4}$ of $\frac{12}{1} = 9$ inches, - - - -	00	0	9
$\frac{7}{8}$ mile $= \frac{7}{8}$ of $\frac{1760}{1} = 1540$ yards,	1540	0	0
Ans.	1540	2	9

(3)

		cwt.	*qr.*	*lb.*	*oz.*
$\frac{3}{4}$*cwt.* $=\frac{3}{4}$ of $\frac{4}{1}$	equal - - - - - -	0	3	00	00
$4\frac{2}{2}$*lb.* 13*oz.*	equal - - - - - -	0	0	21	13
$\frac{1}{2}$*cwt.* and 6*lb.* are	equal - - - - - -	0	2	6	00
	Ans.	1	2	2	13

EXAMPLES IN ADDITION.

(1)

$22\frac{6}{7}$, $19\frac{5}{12}$, $33\frac{5}{9}$.

$22+19+33=74=$whole numbers.

Least common multiple of the denominators is 252.

$6\times\frac{2\,5\,2}{7}=6\times36=216$ 1st numerator.

$5\times\frac{2\,5\,2}{12}=5\times21=105$ 2d numerator.

$5\times\frac{2\,5\,2}{9}=5\times28=140$ 3d numerator.

$216+105+140=461$.

Fractional part $=\frac{4\,6\,1}{2\,5\,2}=1\frac{2\,0\,9}{2\,5\,2}$.

Entire sum $=74+1\frac{2\,0\,9}{2\,5\,2}=75\frac{2\,0\,9}{2\,5\,2}$.

(2)

$26\frac{2}{3}$, $18\frac{7}{8}$, $19\frac{3}{5}$, $13\frac{1}{4}$, $\frac{1\,1\,7}{8}$.

$26+18+19+13+14=90=$whole numbers.

$\frac{8\,0}{1\,2\,0}+\frac{1\,0\,5}{1\,2\,0}+\frac{7\,2}{1\,2\,0}+\frac{3\,0}{1\,2\,0}+\frac{7\,5}{1\,2\,0}=\frac{3\,6\,2}{1\,2\,0}=3\frac{1}{6\,0}=$fractions.

Entire sum $=90+3\frac{1}{6\,0}=93\frac{1}{6\,0}$.

(3)

$471\frac{11}{12}$, $714\frac{19}{20}$, $181\frac{3}{4}$.

$471+714+181=1366=$whole numbers.

$\frac{5\,5}{6\,0}+\frac{5\,7}{6\,0}+\frac{4\,5}{6\,0}=\frac{1\,5\,7}{6\,0}=2\frac{3\,7}{6\,0}=$fractions.

Entire *sum* $=1366+2\frac{3\,7}{6\,0}=1368\frac{3\,7}{6\,0}$ *A.*

(4)

$\frac{1}{2}$ of $3\frac{1}{2}$ of $5 = \frac{35}{4}$, $\frac{1}{3}$ of $5\frac{1}{3}$ of $6 = \frac{32}{3}$, $\frac{1}{5}$ of $\frac{6}{7}$ of $8 = \frac{48}{35}$.

$8+10+1=19$ = whole numbers.

$\frac{3}{4}+\frac{2}{3}+\frac{13}{35}=\frac{315}{420}+\frac{280}{420}+\frac{156}{420}=\frac{751}{420}=1\frac{331}{420}$ = fractions.

Entire sum $=19+1\frac{331}{420}=20\frac{331}{420}$ *cwt.*

(5)

	cwt.	*qr.*	*lb.*	*oz.*
$\frac{4}{7}T.$ =	11	1	17	$13\frac{5}{7}$
$\frac{9}{10}cwt.$ =		3	15	0
Ans.	12	1	7	$13\frac{5}{7}$

(6)

	fur.	*rd.*
$\frac{3}{4}mi.$ =	6	0
$\frac{7}{10}fur.$ =	0	28
Ans.	6	28

(7)

$28\frac{3}{7}$, $33\frac{1}{14}$, $29\frac{1}{21}$.

$28+33+29=90$ = whole numbers.

$\frac{18}{42}+\frac{3}{42}+\frac{2}{42}=\frac{23}{42}$ = fractions.

Entire sum $=90\frac{23}{42}mi.=90mi.\ 4fur.\ 15rd.\ 3ft.\ 11\frac{1}{7}in.$

(8)

	da.	*hr.*	*m.*	*sec.*
$5\frac{5}{6}da.$ =	5	20	0	0
$52\frac{5}{9}m.$ =	0	0	52	$15\frac{15}{19}$
Ans.	5	20	52	$15\frac{15}{19}$

(9)

	qr.	*lb.*	*oz.*	*dr.*
$\frac{4}{7}cwt.$ =	2	7	2	$4\frac{4}{7}$
$8\frac{5}{6}lb.$ =	0	8	13	$5\frac{1}{3}$
$3\frac{9}{10}oz.$ =	0	0	3	$14\frac{2}{5}$
Ans.	2	16	3	$8\frac{4}{35}$

(10)

		da.	*hr.*	*m.*	*sec.*
$\frac{1}{3}yr.$	=	121	18	0	0
$\frac{1}{5}da.$	=	0	4	48	0
$\frac{1}{7}$ of $\frac{7}{3}=\frac{1}{3}hr.$	=	0	0	20	0
$\frac{1}{3}$ of $\frac{2\frac{1}{2}}{2\frac{1}{3}}=\frac{5}{14}m.$	=	0	0	0	$21\frac{3}{7}$
Ans.		121	23	8	$21\frac{3}{7}$

(11)

		yd.	*qr.*	*na.*
$\frac{1}{2}$ of 3 of $\frac{6}{2}$ of $\frac{2}{6}=\frac{3}{2}yd.$	=	1	2	0
$\frac{1}{4}$ of $\frac{4}{5}$ of $5=\frac{1}{1}yd.$	=	1	0	0
$\frac{1}{6}$ of $\frac{3}{2}$ of $\frac{1}{3}=\frac{1}{12}yd.$	=	0	0	$1\frac{1}{3}$
Ans.		2	2	$1\frac{1}{3}$

(12)

$\frac{3}{7}$, $\frac{3}{9}=\frac{1}{3}$, 13, $18\frac{3}{15}=18\frac{1}{5}$.

$13+18=31=$ whole numbers.

$\frac{45}{105}+\frac{35}{105}+\frac{21}{105}=\frac{101}{105}$.

tire sum $=31\frac{101}{105}$.

(13)

$\frac{4}{16}=\frac{1}{4}$, $1\frac{2}{7}=1\frac{5}{7}$, 1, $\frac{16}{9}=1\frac{7}{9}$.

$1+1+1=3=$ whole numbers.

$\frac{63}{252}+\frac{180}{252}+\frac{196}{252}=\frac{439}{252}=1\frac{187}{252}$.

tire sum $=3+1\frac{187}{252}=4\frac{187}{252}$.

(14)

$38\frac{2}{7}$, $13\frac{1}{3}$, $9\frac{3}{5}$.

$38+13+9=60=$ whole numbers.

$\frac{30}{105}+\frac{35}{105}+\frac{63}{105}=\frac{128}{105}=1\frac{23}{105}$.

tire sum $=60+1\frac{23}{105}=61\frac{23}{105}$.

(15)

$6\frac{2}{4}=6\frac{1}{2}$, $13\frac{3}{7}$, $17\frac{3}{15}=17\frac{1}{5}$, $132\frac{2}{8}=132\frac{1}{4}$.

$6+13+17+132=168$.

$\frac{70}{140}+\frac{60}{140}+\frac{28}{140}+\frac{35}{140}=\frac{193}{140}=1\frac{53}{140}$.

Entire sum $=168+1\frac{53}{140}=169\frac{53}{140}$.

(16)

	da.	*hr.*
$\frac{2}{3}wk.=$	4	16
$\frac{1}{2}da.=$	0	12
$1hr.=$	0	1
Ans.	5	5

(17)

	cwt.	*qr.*	*lb.*	*oz.*
$1\frac{1}{7}cwt.=$	1	0	14	$4\frac{4}{7}$
$17\frac{2}{3}lb.=$	0	0	17	$10\frac{2}{3}$
$7\frac{4}{5}oz.=$	0	0	0	$7\frac{4}{5}$
Ans.	1	1	7	$7\frac{4}{105}$

SUBTRACTION OF VULGAR FRACTIONS.

CASE I.

(2)

$\frac{125}{365}-\frac{67}{365}=\frac{125-67}{365}=\frac{58}{365}$.

(3)

$\frac{335}{105}-\frac{169}{105}=\frac{335-169}{105}=\frac{166}{105}$.

(4)

$\frac{4978}{9765}-\frac{1697}{9765}=\frac{4978-1697}{9765}=\frac{3281}{9765}$.

(5)

$\frac{18906}{327}-\frac{909}{327}=\frac{18906-909}{327}=\frac{17997}{327}$.

CASE II.

(2)

$12\frac{1}{2}=\frac{25}{2}$, and $\frac{25}{2}$ of $\frac{1}{6}=\frac{25}{12}$; and $2=\frac{24}{12}$. *Ans.* $\frac{1}{12}$.

(3)

$£2\frac{1}{2}=£\frac{5}{2}$; and $\frac{5}{2}-\frac{3}{15}=\frac{75-6}{30}=£\frac{69}{30}=2\frac{9}{30}$:

But, $£\frac{9}{30}=\frac{9\times20}{30}=6s$. *Ans.* £2 6*s*.

(4)

$\frac{1}{8}$ of $6=\frac{3}{4}$; and $\frac{16}{17}$ of $\frac{1}{2}=\frac{8}{17}$:
$\frac{3}{4}-\frac{8}{17}=\frac{51-32}{68}=\frac{19}{68}$ *Ans.*

(5)

$\frac{1}{7}$ of $\frac{3}{6}$ of $7=\frac{1}{2}$; and $\frac{3}{8}$ of $\frac{5}{4}=\frac{15}{32}$;
$\frac{1}{2}-\frac{15}{32}=\frac{16}{32}-\frac{15}{32}=\frac{1}{32}$ *Ans.*

(6)

$37\frac{11}{15}=\frac{566}{15}$; and $3\frac{5}{7}$ of $\frac{1}{3}=\frac{26}{7}$ of $\frac{1}{3}=\frac{26}{21}$;
$\frac{566}{15}-\frac{26}{21}=\frac{3962-130}{105}=36\frac{52}{105}$.

CASE III.

(2)

	hr.	*m.*	*sec.*
$\frac{1}{2}$ of a day, is equal to - - - - - - -	12	00	00
$\frac{2}{3}$ of a second, equals - - - - - - -	00	00	$00\frac{2}{3}$
Ans.	11	59	$59\frac{1}{3}$

(3)

	ft.	*in.*
$\frac{6}{9}$ of a rod$=\frac{2}{3}$ of $\frac{16\frac{1}{2}}{1}$ feet, equals - - - -	11	00
$\frac{3}{7}$ inches, - - - - - - - - - - - -	00	$00\frac{3}{7}$
Ans.	10	$11\frac{4}{7}$

(4)

	lb.	*oz.*	*pwt.*	*gr.*
$1\frac{3}{4}lb.=\frac{7}{4}lb.=\frac{7}{4}$ of $\frac{12}{1}oz.=21oz.$, equal -	1	9	00	00
$\frac{1}{6}oz.=\frac{1}{6}$ of $\frac{20}{1}$ of $\frac{24}{1}=80gr.$, equal -	0	0	3	8
Ans.	1	8	16	16

(5)

$\frac{4}{15}hhd.=\frac{4}{15}$ of $\frac{63}{1}$ of $\frac{4}{1}=\frac{336}{5}qt.$
$\frac{336}{5}-\frac{6}{19}=\frac{6384-30}{95}=\frac{6354}{95}qt.=16gal.\ 2qt.\ 1pt.\ 3\frac{7}{38}gi.$

(6)

	s.	d.
£½=½ of $\frac{20}{1}$ shillings, equals - - - - - -	10	
¾s.=¾ of $\frac{12}{1}$ pence, equals - - - - - - -	0	9
Ans.	10	9

(7)

	pwt.	gr.
⅗oz.=⅗ of $\frac{20}{1}$pwt.=12pwt., equals - - - - -	12	00
$\frac{7}{8}$pwt.=⅞ of $\frac{24}{1}$gr., equals - - - - - - - -	00	21
Ans.	11	3

(8)

	cwt.	qr.	lb.	oz.	dr.
$4\frac{3}{7}$cwt. =	4	1	17	13	$11\frac{3}{7}$
$4\frac{9}{10}$lb. =	0	0	4	14	$6\frac{2}{5}$
Ans.	4	1	12	15	$5\frac{1}{35}$

GENERAL EXAMPLES.

(1)

	pwt.	gr.
⅜oz. =	7	12
$\frac{7}{8}$pwt.=	0	21
Ans.	6	15

(2)

	hr.	m.	sec.
$\frac{1}{7}$da. =	3	25	$42\frac{6}{7}$
½ of ⅔ of ¾=¼hr.=		15	0
	3	40	$42\frac{6}{7}$

	wk.	da.	hr.	m.	sec.
$3\frac{2}{3}$wk.=	3	4	16	0	0
	0	0	3	40	$42\frac{6}{7}$
Ans.	3	4	12	19	$17\frac{1}{7}$

(3)

	da.
	41
	$6\frac{9}{16}$
Ans.	$34\frac{7}{16}$

(4)

1−⅕=⅘hhd.=50gal. 1qt. 1pt. ⅘gi.

(5)

	mi.	fur.	rd.
$6\frac{1}{2}$mi.=	6	4	0
	4	1	24
Ans.	2	2	16

(6)

$1-\frac{67}{100}=\frac{100-67}{100}=\frac{33}{100}$.

(7)

$9-1\frac{4}{5}=7\frac{1}{5}$.

(8)

	mi.	*fur.*	*rd.*	*ft.*	*in.*	*bar.*
$\frac{5}{7}$*deg.* =	49	5	5	11	9	$1\frac{2}{7}$
$\frac{3}{5}$*mi.* =	0	4	32	0	0	0
Ans.	49	0	13	11	9	$1\frac{2}{7}$

(9)

	R.	*P.*	*Sq. yd.*	*Sq. ft.*	*Sq. in.*
$\frac{4}{11}$*A.* =	1	18	5	4	72
$\frac{1}{2}$*Sq. ft.* =	0	0	0	0	72
Ans.	1	18	5	4	0

$\frac{499}{1485}$

(10)

$\frac{15}{34}+\frac{6}{34}+$ $=\frac{25}{34}$; $1-\frac{25}{34}=\frac{34-25}{34}=\frac{9}{34}$.

(11)

$\frac{1}{9}$ of $\frac{4\frac{1}{2}}{4\frac{1}{4}}=\frac{1}{9}$ $5\frac{1}{4}$ by

$\frac{1}{9}$ of $\frac{5\frac{1}{2}}{5\frac{1}{5}}=\frac{1}{9}$ of $\frac{1}{\frac{26}{5}}$ of $\frac{3}{4}$ of $9=1$

3 of $\frac{1}{6}$ of $\frac{1}{\frac{1200}{17}}$ $\frac{5}{6}$

6

$\frac{1}{6}$ of $\frac{1}{2}$ of $1\frac{8}{17}$ of $\frac{4}{1}$ of $\frac{25}{1}$ of $\frac{16}{1}$

$=\frac{2}{17}$*cwt.* $=\frac{2200}{17}$*dr.*

$\frac{1}{6}$ of $\frac{1}{2}$ of $\frac{5}{26}$ of $\frac{5}{5}$ $=\frac{55}{468}$*cwt.* of $\frac{4}{1}$ of $\frac{25}{1}$ of $\frac{16}{1}$

$=\frac{35200}{117}$*dr.*

$\frac{16}{1}=\frac{35200}{117}$*dr.*

$\frac{85200}{117}=\frac{40400-5984000}{1989}=\frac{6400}{1989}=3\frac{433}{1989}$*dr.*

(12).

$\frac{1}{8}$ of $1\frac{3}{4}$, $\frac{16}{17}$ of $\frac{1}{2}=\frac{8}{17}$;

$\frac{3}{8}-\frac{8}{17}=\frac{51-16}{34}=\frac{35}{34}=1\frac{1}{34}$.

(6)

	s.	
£$\frac{1}{2}$=$\frac{1}{2}$ of $\frac{20}{1}$ shillings, equals - - - - - -	10	
$\frac{3}{4}$s.=$\frac{3}{4}$ of $\frac{12}{1}$ pence, equals - - - - - - -	0	
Ans.		

(7)

	pwt.	gr.
$\frac{3}{5}$oz.=$\frac{3}{5}$ of $\frac{20}{1}$pwt.=12pwt., equals - - - - -	12	00
$\frac{7}{8}$pwt.=$\frac{7}{8}$ of $\frac{24}{1}$gr., equals - - - - - - - -	00	21
Ans.	11	3

(8)

	cwt.	qr.	lb.	oz.	dr.
$4\frac{3}{7}$cwt. =	4	1	17	13	$11\frac{3}{7}$
$4\frac{9}{10}$lb. =	0	0	4	14	$6\frac{2}{5}$
Ans.	4	1	12	15	$5\frac{1}{35}$

GENERAL EXAMPLES.

(1)

	pwt.	gr.
$\frac{3}{8}$oz. =	7	12
$\frac{7}{8}$pwt.=	0	21
Ans.	6	15

(2)

	hr.	m.	sec.
$\frac{1}{7}$da. =	3	25	$42\frac{6}{7}$
$\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$=$\frac{1}{4}$hr.=		15	0
	3	40	$42\frac{6}{7}$

	wk.	da.	hr.	m.	sec.
$3\frac{2}{3}$wk.=	3	4	16	0	0
	0	0	3	40	$42\frac{6}{7}$
Ans.	3	4	12	19	$17\frac{1}{7}$

(3)

	da.
	41
	$6\frac{9}{16}$
Ans.	$34\frac{7}{16}$

(4)

1−$\frac{1}{5}$=$\frac{4}{5}$hhd.=50gal. 1qt. 1pt. $\frac{4}{5}$gi.

(5)

	mi.	fur.	rd.
$6\frac{1}{2}$mi.=	6	4	0
	4	1	24
Ans.	2	2	16

(6)

$1-\frac{67}{100}=\frac{100-67}{100}=\frac{33}{100}$.

(7)

$9-1\frac{4}{5}=7\frac{1}{5}$.

(8)

	mi.	*fur.*	*rd.*	*ft.*	*in.*	*bar.*
$\frac{5}{7}$*deg.* =	49	5	5	11	9	$1\frac{2}{7}$
$\frac{3}{5}$*mi.* =	0	4	32	0	0	0
Ans.	49	0	13	11	9	$1\frac{2}{7}$

(9)

	R.	*P.*	*Sq. yd.*	*Sq. ft.*	*Sq. in.*
$\frac{4}{11}$*A.* =	1	18	5	4	72
$\frac{1}{2}$*Sq. ft.* =	0	0	0	0	72
Ans.	1	18	5	4	0

$\frac{99}{145}\times 40$

(10)

$\frac{16}{34}+\frac{6}{34}+$ $=\frac{25}{34}$; $1-\frac{25}{34}=\frac{34-25}{34}=\frac{9}{34}$.

(11)

$\frac{1}{5}$ of $\frac{4\frac{1}{2}}{4\frac{1}{4}}=\frac{1}{9}$. $5\frac{1}{4}$ by

of $\frac{1}{5}$ of $\frac{18}{17}=\frac{2}{17}$*cwt.* of $\frac{4}{1}$ of $\frac{25}{1}$ of $\frac{16}{1}$

y $\frac{3}{4}$ of $9=$ $\frac{352000}{117}$*dr.*

$\frac{1}{9}$ of $\frac{5\frac{1}{2}}{5\frac{1}{5}}$ $\frac{1}{9}$ of $\frac{\frac{1}{2}}{\frac{26}{5}}$ of $\frac{55}{5}=\frac{55}{468}$*cwt.* of $\frac{4}{1}$ of $\frac{25}{1}$ of $\frac{16}{1}$

f 3 of $\frac{1}{6}$ by $\frac{16}{1}=\frac{352000}{117}$*dr.*

$\frac{512000}{17}$ $-\frac{852000}{117}=\frac{10400-5984000}{1989}=\frac{6400}{1989}=3\frac{433}{1989}$*dr.*

$\frac{5}{6}$

(12)

6 5

$\frac{1}{8}$ of $1-\frac{3}{4}$, $\frac{16}{17}$ of $\frac{1}{2}=\frac{8}{17}$;

$\frac{3}{4}-\frac{8}{17}=\frac{51-16}{34}=\frac{35}{34}=1\frac{1}{34}$.

(13)

$\frac{3}{7}$ of $\frac{3}{2}$ of $7 = \frac{9}{2}$, $\frac{5}{4}$ of $\frac{3}{8} = \frac{15}{32}$;

$\frac{9}{2} - \frac{15}{32} = \frac{144-15}{32} = \frac{129}{32} = 4\frac{1}{32}$.

(14)

$75\frac{7}{15} = \frac{1132}{15}$, $3\frac{5}{7} = \frac{26}{7}$, $\frac{1}{3}$ of $\frac{26}{7} = \frac{26}{21}$;

$\frac{1132}{15} - \frac{26}{21} = \frac{7924-130}{105} = \frac{7794}{105} = 74\frac{8}{35}$.

(15)

	£	s.	d.
£$1\frac{1}{2}$ =	1	10	0
=	0	0	9
Ans.	1	10	9

(16)

	oz.	pwt.	gr.
$1\frac{1}{5}$oz. =	1	4	0
$\frac{7}{8}$pwt. =	0	0	21
Ans.	1	4	21

(17)

	cwt.	qr.	lb.	oz.	dr.
$8\frac{6}{7}$cwt. =	8	3	10	11	$6\frac{6}{7}$
$4\frac{9}{10}$lb. =	0	0		14	$6\frac{2}{5}$
Ans.	8	3		2	$15\frac{16}{35}$

(18)

	lb.	oz.	pwt.	gr.
$3\frac{1}{2}$lb. =	3	6	0	0
$\frac{1}{6}$oz. =	0	0	3	8
Ans.	3	5	16	16

$\frac{4}{3\frac{1}{4}}$ $\frac{3}{4} = \frac{1}{4}$hr.

$1\frac{3}{7}$

$\frac{3}{7}$

A

(19)

	rd.	ft.	in.
rd. =	1	5	6
wk. da. n. =	0	0	$0\frac{3}{7}$
Ans.	1	5	$5\frac{4}{7}$

	3	4	
	0	0	
	3	4	1

(20)

$\frac{46}{49} = \frac{46}{49} \times \frac{41}{37} = \frac{1886}{1813}$, $\times \frac{3}{14} = \frac{1}{6}$;

$\frac{1886}{1813} - \frac{1}{6} = \frac{11316-1813}{10878} = \frac{10503}{10878}$.

(4)

0gal. 1qt.

(5)

	i.	fur.	rd.
		4	0
	1	24	
	2	16	

(21)

$\frac{29}{57} = \frac{13}{19}$lb. =	8	3	9	gr.
$\frac{285}{513}$ =	8	1	2	$1\frac{1}{19}$
=	0	6	1	$7\frac{3}{19}$
Ans.	7	3	9	$1\frac{13}{19}$

MULTIPLICATION OF VULGAR FRACTIONS.

CASE I.

(2)

$\frac{37}{144}$ by $12 = \frac{37}{144} \times 12 = \frac{37}{12} = 3\frac{1}{12}$.

(3)

$\frac{47}{49}$ by $7 = \frac{47}{49} \times 7 = \frac{47}{7} = 6\frac{5}{7}$.

(4)

$\frac{175}{47}$ by $9 = \frac{175}{47} \times 9 = \frac{175 \times 9}{47} = \frac{1575}{47}$.

(5)

$\frac{127}{15}$ by $5 = \frac{127}{15} \times 5 = \frac{127}{3} = 42\frac{1}{3}$.

(6)

$\frac{369}{145}$ by $49 = \frac{369}{145} \times 49 = \frac{18081}{145} = 124\frac{101}{145}$.

CASE II.

(3)

$5\frac{1}{4}$ by $\frac{1}{6} = \frac{21}{4} \times \frac{1}{6} = \frac{7}{8}$.

(4)

$\frac{12}{10}$ by $\frac{2}{4}$ of $9 = \frac{12}{10}$ by $\frac{27}{4} = \frac{12}{10} \times \frac{27}{4} = \frac{81}{10} = 8\frac{1}{10}$.

(5)

$\frac{1}{8}$ of 3 of $\frac{1}{6}$ by $15\frac{1}{9} = \frac{1}{16}$ by $\frac{136}{9} = \frac{1}{16} \times \frac{136}{9} = \frac{17}{18}$.

(6)

$\frac{5}{6}$ by $\frac{2}{3}$ of $\frac{6}{7} = \frac{5}{6}$ by $\frac{4}{7} = \frac{10}{21}$.

(7)

6 by $\frac{2}{3}$ of $5 = 6 \times \frac{10}{3} = \frac{60}{3} = 20$.

(8)

$\frac{2}{9}$ of $\frac{3}{8}$ by $\frac{5}{8}$ of $3\frac{2}{7}=\frac{2}{15}$ by $\frac{115}{56}=\frac{23}{84}$.

(9)

$3\frac{2}{7}$ by $4\frac{14}{33}=\frac{23}{7}\times\frac{146}{33}=\frac{3358}{231}=14\frac{124}{231}$.

(10)

$5\times\frac{2}{3}\times\frac{2}{7}\times\frac{3}{5}\times\frac{25}{6}=\frac{1500}{630}=2\frac{8}{21}$.

(11)

$4\frac{1}{2}$ by $\frac{3}{4}$ of $\frac{1}{7}$ by $18\frac{4}{5}=\frac{9}{2}\times\frac{3}{28}\times\frac{94}{5}=\frac{1269}{140}=9\frac{9}{140}$.

(12)

$14\times\frac{5}{6}\times\frac{4}{5}\times9\times\frac{45}{7}=540$.

ART. 157.

(3)

$67\times9\frac{1}{12}=\begin{cases}67\times9 & \text{-------} & 603\\ 67\times\frac{1}{12} & \text{-------} & 5\frac{7}{12}\end{cases}$

Ans. $608\frac{7}{12}$

(4)

$842\times7\frac{1}{9}=\begin{cases}842\times7 & \text{-------} & 5894\\ 842\times\frac{1}{9} & \text{-------} & 93\frac{5}{9}\end{cases}$

Ans. $5987\frac{5}{9}$

(5)

$3756\times3\frac{1}{5}=\begin{cases}3756\times3 & \text{-------} & 11268\\ 3756\times\frac{1}{5} & \text{-------} & 751\frac{1}{5}\end{cases}$

Ans. $12019\frac{1}{5}$

(6)

$2056\times5\frac{1}{8}=\begin{cases}2056\times5 & \text{-------} & 10280\\ 2056\times\frac{1}{8} & \text{-------} & 342\frac{4}{8}\end{cases}$

Ans. $10622\frac{4}{8}$

APPLICATIONS.

(1)

$\$\frac{3}{4} \times 7 = \$\frac{21}{4} = \$5\frac{1}{4}$.

(2)

$$\$1\tfrac{1}{8} \times 32 = \begin{cases} 32 \times 1 = \$32 \\ 32 \times \frac{1}{8} = \quad 4 \end{cases}$$
$$\$36$$

(3)

$\$1\frac{1}{4} = \$\frac{5}{4}$; $6\frac{1}{4}lb. = \frac{25}{4}$: $\frac{5}{4} \times \frac{25}{4} = \$\frac{125}{16} = \$7\frac{13}{16}$.

(4)

$17\frac{1}{2}yd. = \frac{35}{2}yd.$, and $2\frac{1}{2}s. = \frac{5}{2}s.$: hence,
$\frac{35}{2} \times \frac{5}{2} = \frac{175}{4} = 43\frac{3}{4}s. = £2\ 3s.\ 9d.$

(5)

$15\frac{1}{16} = \frac{241}{16}$: $\frac{241}{16} \times 3 = \frac{723}{16} = \$45\frac{3}{16}$.

(6)

$3\frac{3}{8} = \frac{27}{8}$, and $2\frac{1}{2} = \frac{5}{2}$: $\frac{27}{8} \times \frac{5}{2} = \frac{135}{16} = \$8\frac{7}{16}$.

(7)

$\frac{1}{2} = \frac{31}{2}$, and $17\frac{1}{4} = \frac{69}{4}$: $\frac{31}{2} \times \frac{69}{4} = \frac{2139}{8} = \$267\frac{3}{8}$.

(8)

$\frac{3}{4} = \frac{15}{4}$, and $3\frac{3}{4} = \frac{15}{4}$: $\frac{15}{4} \times \frac{15}{4} = \frac{225}{16} = \$14\frac{1}{16}$.

(9)

$\frac{2}{3}$ of $7 = \frac{14}{3}$: $\frac{4}{5} \times \frac{14}{3} = \frac{56}{15} = 3\frac{11}{15}bu.$

(10)

$\frac{3}{5}$ of $\frac{3}{5} = \frac{3}{5} \times \frac{3}{5} = \frac{9}{25}$.

(11)

$\frac{1}{6}$ of $2\frac{1}{2} = \frac{5}{12}$: $\frac{5}{12} \times 8 = \frac{10}{8} = 3\frac{1}{8}$.

10

(12)

$17\frac{3}{11}=\frac{190}{11}$: $9\frac{5}{9}=\frac{86}{9}$.

$\frac{190}{11}\times\frac{86}{9}=\frac{16340}{99}mi.=165mi.\ 16rd.\ 2ft.\ 8in.$

(13)

$87\frac{3}{11}=\frac{960}{11}$: $\frac{9}{10}\times7\times\frac{11}{15}\times\frac{960}{11}=\frac{2016}{5}=403\frac{1}{5}m$

(14)

$29\frac{3}{7}=\frac{206}{7}$; $1\frac{1}{8}=\frac{9}{8}$: $\frac{206}{7}\times\frac{9}{8}=\$\frac{927}{28}=\$33\frac{3}{28}$.

(15)

$\frac{1}{3}$ of $\frac{1}{9}$ of $\frac{6}{7}=\frac{2}{63}$.

(16)

$23\frac{7}{8}=\frac{191}{8}$: $\frac{191}{8}\times\frac{2}{25}=\frac{191}{100}=\$1\frac{91}{100}$.

(17)

$5\frac{3}{4}=\frac{23}{4}$: $\frac{7}{8}\times\frac{23}{4}=\frac{161}{32}=\$5\frac{1}{32}$.

(18)

$37\frac{11}{63}=\frac{2342}{63}$; $17\frac{5}{8}=\frac{141}{8}$.

$\frac{2342}{63}\times\frac{141}{8}=\frac{550347}{504}=655\frac{17}{84}$.

(19)

$9\frac{1}{4}=\frac{37}{4}$: $\frac{3}{4}\times\frac{37}{4}\times\frac{2}{3}\times\frac{17}{1}=\frac{629}{8}=\$78\frac{5}{8}$.

(20)

$26\frac{1}{3}=\frac{79}{3}$; $2\frac{1}{2}=\frac{5}{2}$; $10\frac{1}{5}=\frac{51}{5}$.

$\frac{2}{3}\times\frac{3}{4}\times\frac{79}{3}\times\frac{1}{4}\times\frac{5}{2}\times\frac{51}{5}=\frac{1343}{16}=\$83\frac{15}{16}$.

DIVISION OF VULGAR FRACTIONS.

CASE I.

(2)

$\frac{18}{37}\div9=\frac{9\ 18}{37}=\frac{2}{37}$: or, $\frac{18}{37}\div9=\frac{18}{37\times9}=\frac{18}{333}=\frac{2}{37}$

(3)

$\frac{15}{9} \div 15 = \frac{15}{19} \frac{405}{} = \frac{27}{19}$: or, $\frac{405}{19} \div 15 = \frac{405}{19 \times 15} = \frac{405}{285} = \frac{27}{19}$.

(4)

$\frac{2755}{37758} \div 19 = \frac{19}{37758} \frac{2755}{} = \frac{145}{37758}$.

(5)

$\frac{379}{1267} \div 15 = \frac{379}{1267 \times 15} = \frac{379}{19005}$.

(6)

$\frac{37}{19} \div 8 = \frac{37}{19 \times 8} = \frac{37}{152}$.

(7)

$\frac{61}{21} \div 37 = \frac{61}{21 \times 37} = \frac{61}{777}$.

CASE II.

(1)

$\frac{1}{8} \div \frac{1}{7} = \frac{1}{8} \times \frac{7}{1} = \frac{7}{8}$.

(2)

$31\frac{1}{4} \div \frac{1}{9} = \frac{13}{4} \div \frac{1}{9} = \frac{13}{4} \times \frac{9}{1} = \frac{117}{4} = 29\frac{1}{4}$.

(3)

$\frac{1}{2}$ of $\frac{1}{3} \div 4\frac{1}{7} = \frac{33}{2}$ of $\frac{1}{3} \div \frac{29}{7} = \frac{11}{2} \times \frac{7}{29} = \frac{77}{58} = 1\frac{19}{58}$.

(4)

$44\frac{1}{33} \div \frac{213}{333} = \frac{1453}{33} \times \frac{333}{213} = \frac{537761}{781} = 68\frac{653}{781}$.

(5)

$71\frac{1}{2} \div \frac{1}{414} = \frac{743}{2} \times \frac{414}{1} = \frac{743 \times 207}{1} = 153801$.

(6)

$\frac{64}{111} \div \frac{23}{1213} = \frac{64}{111} \times \frac{1213}{23} = \frac{77632}{2553} = 30\frac{1042}{2553}$.

(7)

$$\tfrac{1}{2} \text{ of } \tfrac{2}{3} \div \tfrac{2}{3} \text{ of } \tfrac{3}{4} = \tfrac{1}{3} \div \tfrac{1}{2} = \tfrac{1}{3} \times \tfrac{2}{1} = \tfrac{2}{3}.$$

(8)

$$5 \div \tfrac{7}{10} = 5 \times \tfrac{10}{7} = \tfrac{50}{7} = 7\tfrac{1}{7}.$$

(9)

$$5205\tfrac{1}{5} \div \tfrac{4}{5} \text{ of } 91 = \tfrac{26026}{5} \times \tfrac{5}{364} = \tfrac{26026}{364} = 71\tfrac{1}{2}.$$

(10)

$$100 \div 4\tfrac{7}{8} = 100 \div \tfrac{39}{8} = 100 \times \tfrac{8}{39} = \tfrac{800}{39} = 20\tfrac{20}{39}.$$

(11)

$$\tfrac{3}{4} \text{ of } \tfrac{7}{8} \div \tfrac{2}{3} = \tfrac{21}{32} \div \tfrac{2}{3} = \tfrac{21}{32} \times \tfrac{3}{2} = \tfrac{63}{64}.$$

(12)

$$\tfrac{1}{6} \text{ of } 50 \div 4\tfrac{1}{3} = \tfrac{125}{737} \div \tfrac{13}{3} = \tfrac{125}{737} \times \tfrac{3}{13} = \tfrac{125}{13} = 9\tfrac{8}{13}.$$

(13)

$$14\tfrac{1}{8} \text{ of } \tfrac{1}{9} \div 3\tfrac{1}{3} \text{ of } 6 = \tfrac{113}{72} \div 20 = \tfrac{113}{72} \times \tfrac{1}{20} = \tfrac{113}{1440}.$$

(14)

$$34\tfrac{1}{7} \div \frac{54\tfrac{1}{8}}{93\tfrac{5}{11}} = \tfrac{239}{7} \div \frac{\frac{433}{8}}{\frac{1028}{11}} = \tfrac{239}{7} \div \tfrac{4763}{8224} =$$

$$2\tfrac{39}{7} \times \tfrac{8224}{4763} = \tfrac{196553536}{3334341} = 58\tfrac{31758}{3334341}.$$

APPLICATIONS.

(2)

$$\$\tfrac{3}{7} \div 10\tfrac{1}{2} lb. = \$\tfrac{3}{7} \div \tfrac{21}{2} lb. = \tfrac{3}{7} \times \tfrac{2}{21} = \tfrac{6}{147} = \$\tfrac{2}{49} = 4\tfrac{4}{49} cts.$$

(3)

$$\$3 \div \tfrac{4}{7} = 3 \times \tfrac{4}{7} = \tfrac{21}{4} = \$5\tfrac{1}{4}.$$

(4)

$$\$21\tfrac{1}{2} \div 7\tfrac{13}{16} = \$\tfrac{43}{2} \div \tfrac{125}{16} = \tfrac{43}{2} \times \tfrac{16}{125} = \tfrac{344}{125} = \$2\tfrac{94}{125}.$$

(5)

$\$2\frac{5}{9} \div 4\frac{1}{7} = \$\frac{23}{9} \div \frac{29}{7} = \frac{23}{9} \times \frac{7}{29} = \$\frac{161}{261}$ *per gallon.*

$\frac{61}{61} \div 4 = \frac{161}{261} \times \frac{1}{4} = \$\frac{161}{1044}$ *per qt.* $= \frac{16100}{1044}$ *cts.* $= 15\frac{110}{261}$ *cts.*

(6)

$1\frac{1}{8}$ *hhd.* $= \frac{9}{8}$ *hhd.* : $\frac{9}{8}$ of $\frac{63}{1}$ of $\frac{4}{1} = \frac{567}{2}$ *qts.*

$\$250\frac{1}{3} \div \frac{567}{2} = \frac{751}{3} \div \frac{567}{2} = \frac{751}{3} \times \frac{2}{567} = \$\frac{1502}{1701} =$
$88\frac{512}{1701}$ *cts.*

(7)

$\$7\frac{5}{8} \div 8 = \$\frac{61}{8} \div 8 = \$\frac{61}{8} \times \frac{1}{8} = \$\frac{61}{64} = 95\frac{5}{16}$ *cts.*

(8)

$165\frac{3}{9} \div 8\frac{1}{2} = \frac{496}{3} \div \frac{17}{2} = \frac{496}{3} \times \frac{2}{17} = \frac{992}{51} = 19\frac{23}{51}$.

(9)

$375\frac{6}{5} \div 176\frac{3}{4} = \frac{1881}{5} \div \frac{707}{4} = \frac{1881}{5} \times \frac{4}{707} = \frac{7524}{3535} =$
$\$2\frac{454}{3535}$.

(10)

$4284 \div \frac{7}{8} = 4284 \times \frac{8}{7} = 4896$ *lb.*

(11)

$129 \div 7\frac{6}{7} = 129 \div \frac{55}{7} = 129 \times \frac{7}{55} = \frac{903}{55} = 16\frac{23}{55}$ *bar.*

(12)

$666\frac{2}{3} \div 6 = 111\frac{1}{9}$.

(13)

$\frac{3}{11} - 28\frac{11}{26} = \frac{190}{11} \div \frac{739}{26} = \frac{190}{11} \times \frac{26}{739} = \frac{4940}{8129}$ *lb.*

(14)

$\frac{2}{17} \div 14\frac{3}{5} = \frac{2740}{17} \div \frac{73}{5} = \frac{2740}{17} \times \frac{5}{73} = \frac{13700}{1241} =$
$11\frac{49}{1241}$ *bar.*

(15)

$5205\frac{1}{5} \div \frac{4}{5}$ of $90 = \frac{26026}{5} \times 72 = \frac{26026}{5} \times \frac{1}{7}$
$\frac{13013}{180} = \$72\frac{53}{180}$.

(16)

$\frac{1}{17} \div 27 = \frac{1}{17} \times \frac{1}{27} = \frac{1}{459} A.$

(17)

$2\frac{1}{3}$ of $\frac{1}{3}$ of $2 \div \frac{1}{3}$ of $2\frac{2}{3}$ of $\frac{9}{11} = \frac{14}{9} \div \frac{8}{11} = \frac{154}{9}$;
$\frac{77}{36} = 2\frac{5}{36}$.

(18)

$\frac{5}{6}$ of $5040 = 4200$: $5040 - 4200 = 840$,
$\frac{3}{5}$ of $840 = 504$: $840 - 504 = 336$,
$336 \div 9 = \$37\frac{1}{3}$. *Ans.*

(19)

$15000 \div 3 = 5000$ widow's part.
$15000 - 5000 = 10000$: $\frac{2}{3}$ of $10000 = 6666\frac{2}{3}$ so
$10000 - 6666\frac{2}{3} = 3333\frac{1}{3}$: $3333\frac{1}{3} \div 9 = \$370\frac{16}{27}$
child's part.

DECIMAL FRACTIONS.

(6)	(7)	(
2.00000003	.492	3000
(9)	(10)	(
47.0021	.001503	39.
(12)	(13)	(
3000.000840	0.650	500

(15)	(16)	(17)
600.0018	.000003	.00039

ART. 164.

(2)	(6)	(9)
$95.895	$12.003	$4.006

ADDITION OF DECIMAL FRACTIONS.

(1)	(2)	(3)
4.035	365.103113	67.407.
763.196	.76012	97.004
445.3741	1.34976	4.000
91.3754	.3549	.6
ns. 1303.9805	61.11	.06
	Ans. 428.677893	.3
		Ans. 169.371

(4)	(5)	(6)
.0007	.0049	27.
1.0436	47.0426	14.
.4	37.0410	49.
.05	360.0039	126.
.047	*Ans.* 444.0924	999.
ns. 1.5413		.469
		.2614
		Ans. 1215.7304

(7)	(8)	(9)
15.	99.	
100.	99.	
67.	31.	.7509
1.	.25	.0074
5.	60.102	69.8408
33.467	.29	.6109
24.6	100.347	
ns. 246.067	*Ans.* 389.989	Ans. 71.2100

(10)

29.3
465.
.221
Ans. 494.521

(11)

200.139
440.009
1.101
Ans. $641.249

(12)

.1
.01
.001
Ans. 0.111

(13)

4.
.0006
Ans. 4.0006

(14)

1.111
6.003
4.08
9.006
100.600
.901
8.06
Ans. $129.761

(15)

4.06
9.003
14.391
104.999
999.901
.004
.006
.001
Ans. $1132.365

(16)

4.25
5.075
7.0025
Ans. 16.3275

(17)

151.7
70.602
4.06
807.2659
Ans. 1033.6279

(18)

13.25
8.4
23.051
6.0
0.75
Ans. 51.451

(19)

.25
.365
.6
.000009
Ans. 1.215009

(20)

23000010.
1000.00004
27.000019
7.5
Ans. 23001044.500059

(21)

.000006
.0004
.00019
.16
.4

Ans. .560596

SUBTRACTION OF DECIMAL FRACTIONS.

(1)	(2)	(3)
3295.0000	291.10001	10.000001
.0879	41.375	.111111
ns. 3294.9121	*Ans.* 249.72501	*Ans.* 9.888890

(4)	(5)	(6)
396.0000	1.000	6378.0
.0008	.001	.1
ns. 395.9992	*Ans.* .999	*Ans.* 6377.9

(7)	(8)	(9)
365.007500	21.004	260.4709
.000003	.0097	.0000047
ns. 365.007497	*Ans.* 20.9943	*Ans.* 260.4708953

(10)	(11)	(12)
10.0302	2.0100	35000.
.000019	.0006	.035
ns. 10.030181	*Ans.* 2.0094	*Ans.* 34999.965

(13)	(14)
4262.0246	346.523120
23.41653	219.691245943
Ans. 4238.60807	*Ans.* 126.831874057

(15)	(16)	(17)
64.075	. 107.	1.5
.195326	.0007	.3785
Ans. 63.879674	*Ans.* 106.9993	*Ans.* 1.1215

(18)	(19)
96.71	43.075
96.709	8.000023
Ans. .001	*Ans.* 35.074977

MULTIPLICATION OF DECIMAL FRACTIONS.

(1)	(3)
3.049	496.0135
.012	1.496
6098	29760810
3049	44641215
Ans. .036588	19840540
	4960135
	Ans. 742.0361960

(4)	(5)
1.000001	.000147
.001	.000001
Ans. .001000001	*Ans.* .000000000147

(6)	(7)	(8)
300.27	31.00467	.5
.31	10.03962	.5
30027	6200934	*Ans.* .25
90081	18602802	
Ans. 9308.37	27904203	
	9301401	
	3100467	
	Ans. 311.2751050254	

(9)

.5
.005
Ans. .0025

(10)

596.04
.00004
Ans. .0238416

(11)

38049.079
.00008
Ans. 3.04392632

(12)

6.29
2.75
3145
4403
1258
Ans. $17.2975

(13)

.234
61
234
1404
Ans. $14.274

(14)

12.836
.354
51344
64180
38508
Ans. $4.543944

(15)

.06
.06
Ans. .0036

(16)

49000
.0049
441
196
Ans. 240.1

(17)

.1234
4.6
7404
4936
Ans. .56764

(18)

375.6
.125
18780
7512
3756
Ans. $46.9500

(19)

36.251
.029
326259
72502
Ans. $1.051279

(20)

89.3421001
.0000028
7147368008
1786842002
Ans. $0.00025015788028

(21)

341.45
.007
Ans. 2.39015

(22)

.004
.004
Ans. .000016

(23)

.007853
.035
39265
23559
Ans. .000274855

(24)

26.000375
.00007
Ans. .00182002625

DIVISION OF DECIMAL FRACTIONS.

(1)

2.11)2.3421(1.11
2 11
232
211
211
211
Ans. 1.11

(2)

3.01)12.82561(4.261
12 04
785
602
1836
1806
301
301
Ans. 4.261

(3)

1.01)33.66431(33.331
30 3
336
303
334
303
313
303
101
101
Ans. 33.331

(4)

.01).010001
Ans. 1.0001

(5)

.002)8.2470
Ans. 4123.5

(6)

3)37.57602
12.52534

.3)37.57602
125.2534

.03)37.57602
1252.534

.003)37.57602
12525.34

.0003)37.57602
125253.4

(7)

8)129.75896
16.21987

.08)129.75896
1621.987

.008)129.75896
16219.87

.0008)129.75896
162198.7

00008)129.75896
1621987

(8)

9)187.29900
20.81100

.9)187.29900
208.1100

.09)187.29900
2081.100

.009)187.29900
20811.00

.0009)187.29900
208110.0

.00009)187.29900
2081100

(9)

6)764.2043244
127.3673874

.06)764.2043244
12736.73874

.006)764.2043244
127367.3874

.0006)764.2043244
1273673.874

.00006)764.2043244
12736738.74

.000006)764.2043244
127367387.4

ART. 173.

(2)

100001)2194.021940(21940
2000 02
194001
100001
940009
900009
400004
400004
0000000
0000000 *Ans.* 21940

(3)

.325947)9811.004700(30100
9778 41
325947
325947
00

(4)

.0001).1000
1000

(5)

.1)10.0
100

(6)

.6)6.0
10

.06)6.00
100

.006)6.000
1000

.2)6.0
30

.3)6.0
20

.003)6.000
2000

.000012)6.000000
500000

.5)6.0
12

.05)6.00
120

.005)6.000
1200

ART. 174.

(3)

4.5)37.4(8.3111+
36 0
140
135
50
45
50
45
50
45
5

(4)

375)586.4(1.563+
375
2114
1875
2390
2250
1400
1125
275

(5)

81.032)94.0360(1.160+
81 032
130049
81032
490170
486192
39780

ADDITIONAL EXAMPLES.

(1)

94).600(.00638+
564
360
282
780
752
28

Ans. $0.00638+

(2)

267)28.0(.10486+
26 7
1300
1068
2320
2136
1840
1602
238

Ans. $0.10486+

(3)

425)6.35(14.941+
4 25
2100
1700
4000
3825
1750
1700
500
425
75

Ans. 14.941+

(4)

2.25)36.2678(16.119+
22 5
1376
1350
267
225
428
225
2030
2025
5

Ans. $16.119+

(5)

12)1.000000

Ans. .083333+

(6)

.25 of 3.26=3.26÷4=.815

3.04
.034
1216
912
10336

(7)

35 24
.35 .024
175 96
105 48
12.25 .576

12.25).5760(.0470204+
4900
8600
8575
2500
2450
5000
4900
100

.10336).81500(7.885+
72352
91480
82682
87980
82682
52980
51680
1300

(8)

.75)141.00(188
75
660
600
600
600
Ans. 188*bu.*

(9)

.20341
.001
.00044).00020341(.46229+
176
274
264
101
88
130
88
420
396
24
Ans. .46229+*bu.*

(10)

53.1)2.000(.0376
1 593
4070
3717
3530
3186
344
Ans. $0,0376

(11)

.1045)125.0000(1196.172+
104 5
2050
1045
10050
9405
6450
6270
1800
1045
7550
7315
2350
2090
260

(12)

.000000001).000001000
Ans. 1000

APPLICATIONS IN THE FOUR PRECEDING RULES.

(1)

1st parcel,	127.003
2d "	6.300
3d "	4.010
4th "	90.000001
Ans.	227.313001

(2)

1st, - - -	60.001
2d, - - -	39.0001
3d, - - -	26.1
Ans.	125.1011

(3)

	20,03
	4,1
	6,001
	18,01
Ans.	$48,141

(4)

A - - -	$504,342
B - - -	$350,1965
C - - -	$100,11
D - - -	$ 99,334
E - - -	$9001,32
Ans.	$10055,3025

(5)

B - - -	$936,000
A - - -	1,301
Ans.	$934,699

(6)

37.5*yd.*
at - $1,25 *per yd.*

1875
750
375

Ans. $46,875

(7)

13.12 *cords*, at $4.25 = $55,76
13*bu.* of wheat, at $1.06 = $13,78
$69,54
13*yd.* of cloth, at $4.07 = $52,91
Ans. $16,63

(8)

$339,193
12

Ans. $4070,316

(9)

5.91
19
5319
591

Ans. 112.29

(10)

$5,47
8.3
1641
4376

Ans. $45,401

(11)

$1,001
365
5005
6006
3003

Ans. $365,365

(12)

,375
·2
Ans. $0,750

(13)

12)1473,194
Ans. $122,766$\frac{1}{6}$

REDUCTION OF VULGAR FRACTIONS TO DECIMALS.

(2)

4)1.00
.25

1129)9.000(.00797+
7 903
10970
10161
8090
7903
187

(3)

40)1.000
Ans. .025

1000)3.000(.003
3.000

39)27.0(.692+
23 4
360
351
90
78
12

60006)11.0000(.000183+
6 0006
499940
480048
198920
180018
18902

(4)

```
2)1.0
  .5

1785)5.000(.0028+
     3 570
     14300
     14280
        20
```

(5)

```
210456891)314957123(1.496+
          210456891
          1045002320
           841827564
          2031747560
          1894112019
           1376355410
           1262741346
            113614064
```

(6)

```
6)8.000
  1.333+

8436)1375.0(0.162+
     843 6
     53140
     50616
      25240
      16872
       8368

4121)3265.0(0.792+
     2884 7
      38030
      37089
       9410
       8242
       1168

123)574(4.66+
    492
     820
     738
      820
      738
       82
```

(7)

```
2|0)17.0|0
Ans.  .85
```

(8)

4|0)3.00|0

Ans. .075

(9)

125)17.00(.136

12 5

450

375

750

750

(10)

800)7.000|00

Ans. .00875

(11)

1250)372.0(.2976

250 0

12200

11250

9500

8750

7500

7500

(12)

1600)11.000(.006875

9 600

14000

12800

12000

11200

8000

8000

(13)

128|0)15.0(.01171875

12 8

220

128

920

896

240

128

1120

1024

960

896

640

640

(14)

256|0)347(.135546875

256

910

768

1420

1280

1400

1280

1200

1024

1760

1536

2240

2048

1920

1792

1280

1280

(15)

10000)1.0000

Ans. .0001

(16)

```
5625)3476.0(222464
     3125 0
     -------
      35100
      31250
      -----
      38500
      31250
      -----
       72500
       62500
       -----
       100000
        93750
        -----
        62500
         62500
         -----
```

(17)

```
2048|000)1.0000(.00000048828125
          8192
          ----
          18080
          16384
          -----
          16960
          16384
          -----
           5760
           4096
           ----
           16640
           16384
           -----
            2560
            2048
            ----
             5120
             4096
             ----
             10240
             10240
             -----
```

(18)

```
7)3.0000
  ----
Ans. .4285+
```

(19)

```
17)15.0(.88235+
   13 6
   ----
    140
    136
    ---
     40
     34
     --
      60
      51
      --
       90
       85
       --
        5
```

(20)

```
35)3.00(.0857142+
   2 80
   ----
    200
    175
    ---
     250
     245
     ---
      50
      35
      --
      150
      140
      ---
       100
        70
        --
        30
```

(21)

19)17.0(.89473684+
15 2
180
171
90
76
140
133
70
57
130
114
160
152
80
76
4

(22)

1365)19.00(.013919+
13 65
5350
4095
12550
12285
2650
1365
12850
12285
565

(23)

5907)706.0(.119519
590 7
11530
5907
56230
53163
30670
29535
11350
5907
54430
53163
1267

(24)

$\frac{2}{5}$ of $\frac{3}{5}=\frac{6}{25}$; $\frac{5}{6}$ of $3\frac{2}{7}=\frac{115}{42}$;
$\frac{6}{25}\times\frac{115}{42}=\frac{23}{35}$.

35)23.0(.65714
21 0
200
175
250
245
50
35
150
140
10

(25)

$\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{7}{8}=\frac{7}{24}$; $\frac{1}{8}$ of $\frac{2}{4}=\frac{1}{16}$;
$\frac{7}{24}-\frac{1}{16}=\frac{7}{24}\times\frac{16}{1}=\frac{14}{3}=3)14.0000$
Ans. 4.6666+

(26)

$\frac{4}{11}$ of $\frac{7}{8}=\frac{7}{22}$.

22)7.0(.3181818+
66
40
22
180
176
40
22
180
176
40
22
180
176
4

(27)

$87\frac{3}{11}=\frac{960}{11}$; $\frac{11}{15}$ of $\frac{960}{11}=64$;
$\frac{9}{10}$ of $\frac{7}{1}=\frac{63}{10}$;
$\frac{64}{1}\times\frac{63}{10}=\frac{2016}{5}$.

5)2016.0
Ans. $403,2

(28)

$7\frac{1}{2}=\frac{15}{2}$; $8\frac{3}{4}=\frac{35}{4}$;
$\frac{4}{5}+\frac{15}{2}+\frac{35}{4}=\frac{16}{20}+\frac{150}{20}+\frac{175}{20}=\frac{341}{20}$.

2|0)341.0|0
Ans. $17,05

(29)

$\frac{5}{8}$ of $\frac{18}{1}=\frac{45}{4}$; $\frac{4}{11}$ of $\frac{11}{12}$ of $\frac{81}{11}=\frac{27}{11}$;
$\frac{45}{4}+\frac{27}{11}=\frac{495}{44}+\frac{108}{44}=\frac{603}{44}$.

44)603.0(13.70454+
44
163
132
310
308
200
176
240
220
200
176
24

(30)

$\frac{2}{3}$ of $\frac{5}{1}=\frac{10}{3}$; $\frac{3}{5}$ of $8\frac{3}{4}=\frac{21}{4}$;
$\frac{21}{4}-\frac{10}{3}=\frac{63}{12}-\frac{40}{12}=\frac{23}{12}$.

12)23.00000
Ans. 1.91666+

(31)

$\frac{6}{7}+\frac{1}{9}=\frac{1323}{2772}+\frac{2376}{2772}+\frac{308}{2772}=\frac{4007}{2772}$.

2772)4007(1.4455+
2772
12350
11088
12620
11088
15320
13860
14600
13860
740

(32)

$\frac{1}{3}$ of $\frac{1}{7}=\frac{1}{21}$; $\frac{43}{3}$ of $\frac{1}{12}=\frac{43}{36}$;
$\frac{43}{36}-\frac{1}{21}=\frac{301}{252}-\frac{12}{252}=\frac{289}{252}$.

252)289(1.1468+
252
370
252
1180
1008
1720
1512
2080
2016
64

REDUCTION OF DENOMINATE DECIMALS.

CASE I.

(1)

$=16oz.=16\times16=256dr.$
56)7.00(.02734375*lb.*
5 12
1880
1792
880
768
1120
1024
960
768
1920
1792
1280
1280

(2)

£1=20*s.*=240*d.*
240)26.0(.108333+
24 0
2000
1920
800
720
800
720
800
720
80

(3)

1*A.* = 4*R.* = 160*P.*

160).0560(.00035*A.*
480
800
800

(4)

1*da.* = 24*hr.* = 1440*m.*

1440)14.000(.0097222*da.* +
12 960
10400
10080
3200
2880
3200
2880
3200
2880
320

(5)

1*pk.* = 8*qt.* = 16*pt.*

16).210(.013125*pk.*
16
50
48
20
16
40
32
80
80

(6)

1*da.* = 24*hr.*

24)3.0(.125*da.*
24
60
48
120
120

(7)

1*mi.* = 1760*yd.* = 5280*ft.*

5280)375678(71.151*mi.* +
36960
6078
5280
7980
5280
27000
26400
6000
5280
720

(8)

5.5)36.0(6.5454*rd.* +
33 0
300
275
250
220
300
275
250
220
80

(9)

$r. = 31.5gal. = 126qt.$

$6).500(.00396bar. +$

378

1220

1134

860

756

104

(10)

$1cwt. = 100lb. = 1600oz.$

$16|00).70(.0004375cwt.$

64

60

48

120

112

80

80

CASE II.

(1)

$\frac{1}{4}d. = .25d.$

$12)3.25d. = .2708 +$

$20)17.2708s.$

$.86354$

$s.$ £19.86354+

(2)

$6d. = \frac{6}{12}s. = .5s.$

$20)15.5$

$.775$

Ans. £0.775

(3)

$7\frac{1}{2}d. = 7.5d.$

$12)7.500$

ns. .625

(4)

$24gr. = 1pwt.$

$24)16.0(.6666pwt. +$

14 4

160

144

160

144

160

144

16

$20pwt. = 1oz.$

$20)12.6666$

$.63333$

$12oz. = 1lb.$

$12)5.63333$

.46944+

Ans. 2.469444lb.+

(5)

$. = \frac{9}{12}ft. = .75ft.$

$3)3.75$

Ans. 1.25*yd.*

(6)

16*dr.*=1*oz.*

16)12.0(.75*oz.*
11 2
80
80

16)0.75(.046875*lb.*
64
110
96
140
128
120
112
80
80

Ans. 1.046875*lb.*

(7)

1*L.*=24*fur.*

24)2.00(.0833+
1 92
80
72
80
72
8

Ans. 5.0833*L.*+

CASE III.

(1)

.002084*lb.*
12
.025008*oz.*
20
.500160*pwt.*
24
2000640
1000320

Ans. 12.003840*gr.*

(2)

.625*cwt.*
4
2.500*qr.*
25
12.5*lb.*
16
8.0*oz.*

Ans. 2*qr.* 12*lb.* 8*oz.*

(3)

.625*gal.*
4
2.500*qt.*
2
1.000*pt.*
ns. 2*qt.* 1*pt.*

(4)

£.3375
20
6.7500
12
9.00*d.*
Ans. 6*s.* 9*d.*

(5)

.3375*T.*
20
6.7500*cwt.*
4
3.00*qr.*
Ans. 6*cwt.* 3*qr.*

(6)

.05*A.*
4
.20*R.*
40
8.00*P.*
ns. 8*P.*

(7)

.875*pi.*
2
1.750*hhd.*
63
225
450
47.25*gal.*
4
1.00*qt.*
Ans. 1*hhd.* 47*gal.* 1*qt.*

(8)

.125*hhd.*
54
500
625
6.750*gal.*
4
3.00*qt.*
Ans. 6*gal.* 3*qt.*

(9)

.375
365
1875
2250
1125
136.875*da.*
24
3500
1750
21.000*hr.*
s. 136*da.* 21*hr.*

(10)

£.085
20
1.700*s.*
12
8.400*d.*
4
1.600*far.*
Ans. 1*s.* 8½*d.*+

(11)

.86*cwt.*
4
3.44*qr.*
25
220
88
11.00*lb.*
Ans. 3*qr.* 11*lb.*

(12)

.82 *day* = 19*hr.* 40*m.* 48*sec.*
.32 *hour* = 19*m.* 12*sec.*
Ans. 19*hr.* 21*m.* 36*sec.*

(13)

1.089*mi.*
320
1780
267
28.480*rd.*
16½
288
48
24
7.920*ft.*
12
11.04*inch.*
Ans. 1*mi.* 28*rd.* 7*ft.* 11.04*in.*

(14)

.09375*lb.*
16
56250
9375
1.50000*oz.*
16
8.0*dr.*
Ans. 1*oz.* 8*dr.*

(15)

.28493*yr.*
365
142465
170958
85479
103.99945*da.*
24
399780
199890
23.98680*hr.*
60
59.20800*m.*
60
12.48000
Ans. 103*da.* 23*hr.* 59*m.* 12.48*sec.*

(16)

£1.046
20
0.920*s.*
12
11.040*d.*
Ans. £1 0*s.* 11.04*d.*

(17)

£1.88
20
17.60*s.*
12
7.20*d.*
4
.80*far.*
Ans. £1 17*s.* 7*d.*+

PROMISCUOUS QUESTIONS.

(1)

$11\frac{5}{8}T. = 11.625T.$

11.625
17.37
81375
34875
81375
11625

ns. $201,92625

(2)

$12gal.\ 3qt.\ 1pt. = 51.5qt.$

51.5
.28
4120
1030

Ans. $14,420

(3)

9.17
20
16)183.40(11*cwt.*
16
23
16
7.40
4
16)29.6(1*qr.*
16
13.6
25
680
272
16)340(21*lb.*+
32
20
16
4

ns. 11*cwt.* 1*qr.* 21*lb.*+

(4)

4)3.00
4)2.75
57.6875*yd.*
6.78
4615000
4038125
3461250

Ans. $391,121250

(5)

4|0)38.00
4)2.95
7.7375*A.*
64.50
386875
309500
464250

Ans. $499,06875

(6)

4.67
9.87
10.01
11.0012
35.5512*bu.*
18.0679
17.4833
1.03
524499
174833
9)18.007799
Ans. $2,000866$\frac{5}{9}$

(7)

3.4775
693
104325
312975
208650
Ans. $2409,9075

(8)

1.125
917
7875
1125
10125
Ans. $1031,625

OF CANCELLING.

(3)

$$\frac{1860}{36}=\frac{\cancel{6}\times 5\times\cancel{2}\times 31}{\cancel{6}\times\cancel{2}\times 3}=\frac{155}{3}=51\tfrac{2}{3}.$$

(4)

$$\frac{7920}{720}=\frac{\cancel{10}\times\cancel{9}\times\cancel{4}\times 11\times\cancel{2}}{\cancel{10}\times\cancel{9}\times\cancel{2}\times\cancel{4}}=11.$$

(5)

$$\frac{1890}{210}=\frac{\cancel{10}\times\cancel{3}\times\cancel{7}\times 9}{\cancel{10}\times\cancel{7}\times\cancel{3}}=9.$$

(6)

$$\frac{1260}{504}=\frac{\cancel{12}\times5\times\cancel{7}\times\cancel{3}}{\cancel{12}\times\cancel{7}\times2\times\cancel{3}}=\frac{5}{2}=2\tfrac{1}{2}.$$

(7)

$$\frac{1768}{221}=\frac{\cancel{13}\times\cancel{17}\times8}{\cancel{13}\times\cancel{17}}=8.$$

(8)

$$\frac{2856}{238}=\frac{12\times\cancel{2}\times\cancel{7}\times\cancel{17}}{\cancel{2}\times\cancel{7}\times\cancel{17}}=12.$$

ART. 188.

(1)

$$\frac{\overset{7}{\cancel{1}}\times\overset{3}{\cancel{6}}\times9\times\cancel{14}\times\cancel{15}\times\cancel{7}\times\cancel{8}}{\underset{\cancel{6}}{\cancel{36}}\times128\times\underset{4}{\cancel{56}}\times\cancel{20}}=\frac{63}{512}.$$

(2)

$$\frac{\overset{9}{\cancel{18}}\times\cancel{36}\times\overset{3}{\cancel{72}}\times\cancel{144}}{\underset{\cancel{2}}{\cancel{6}}\times\cancel{6}\times\cancel{8}\times9\times\cancel{12}\times\cancel{8}}=27.$$

RULE OF THREE BY ANALYSIS.

(2)

29 : 58 :: 30 : *Ans.*

$\frac{58}{29}=2$: $30\times2=60$ *miles.*

(4)

$\frac{1}{8}$: $\frac{5}{16}$:: $\frac{2}{5}$: *Ans.*

$\frac{1}{8})\frac{5}{16}=\frac{5}{2}$: $\frac{5}{2}\times\frac{2}{5}=\$1$.

(5)

3 : 9 :: 84 : *Ans.*

$\frac{9}{3}=3$: $84\times3=252$ *miles.*

(6)

$\$1{,}28\div8=16$*cts.* cost per *lb.*

$16\times13=208=\$2{,}08$.

(7)

$\frac{3}{4} : \frac{9}{4} :: \$8{,}25 : Ans.$

$\frac{3}{4})\frac{9}{4} = 3 : \$8{,}25 \times 3 = \$24{,}75.$

(8)

$300 : 200 :: \$570 : Ans$

$\frac{200}{300} = \frac{2}{3} : \$570 \times \frac{2}{3} = 380.$

TO FIND THE COST OF THINGS BY THE 100, 1000, &c.

(1)

1350
11
Ans. $148,50

(2)

36578
6,50
182890
219468
Ans. $237,75700

(3)

6359
9,25
31795
12718
57231
Ans. $588,2075

(4)

13918
14,37
97426
41754
55672
13918
Ans. $200,00166

(5)

18759
5,50
93795
93795
Ans. $1031,74 50

(6)

6559
9,25
32795
13118
59031
Ans. $606,70 75

(7)

37032
85,72
74064
259224
185160
296256
Ans. $3174,383 04

APPLICATIONS IN THE RULE OF THREE.

(1)

4 : 55 : : $12 : *Ans.*

Ans. 165.

(2)

2*cwt.*=100*lb.*×2=200*lb.*

lb. *lb.* *d.*

7 : 200 : : 5 : *Ans.*

Ans. £4 3*s.* 4*d.*

(3)

yd. *yd.* $

40 : 325 : : 170 : *Ans.*

Ans. $1381,25.

(4)

240 : 1200 : : 660*lb.* : *Ans.*

Ans. 3300*lb.*

(5)

3*hhd.*=63×3=189*gal.*

gal. *gal.* *cts.*

2 : 189 : : 65 : *Ans.*

Ans. $61,425.

(6)

365—52 Sundays=313*da.*

da. *da.* *mi.*

6 : 313 : : 210 : *Ans.*

Ans. 10955*mi.*

(7)

3 pieces =25×3=75*yd.*

yd. *yd.*

1 : 75 : : $3,25 : *Ans.*

Ans. $243,75.

(8)

25 : 100 : : 40 : *Ans.*

Ans. 160*da.*

(9)

400 : 100 : : 40 : *Ans.*

Ans. 10*da.*

(10)

£1=20*s.*=240*d.*

3*s.* 4*d.*=40*d.*

£679 6*s.*=163032*d.*

d. *d.* *d.*

240 : 40 : : 163032 : *Ans.*

Ans. £113 4*s.* 4*d.*

(11)

bu. *bu.* *da.*
90 : 450 : : 6 : *Ans.*
Ans. 30*da.*

(12)

5*cwt.* 3*qr.* 14*lb.*=589*lb.*
£6 1*s.* 8*d.*=1460*d.*
35*cwt.* 28*lb.*=3528*lb.*
lb. *lb.* *d.*
589 : 3528 : : 1460 : *Ans.*
Ans. £36 8*s.* 9*d.*+.

(13)

3*cwt.*=100×3=300*lb.*
lb. *lb.* *d.*
1 : 300 : : 15 : *Ans.*
Ans. £18 15*s.*

(14)

7*s.* 3*d.*=87*d.*
£13 15*s.* 6*d.*=3306*d.*
d. *d.* *qr.* *qr.*
87 : 3306 : : 3 : 114
Ans. 28*yd.* 2*qr.*

(15)

9*lb.* 9*oz.* 12*pwt.*=56448*gr.*
£470 8*s.*=9408*s.*=112896*d.*
gr. *gr.* *d.*
56448 : 1 : : 112896 : *Ans.*
Ans. 2*d.*

(16)

4 bales contain 24 pieces.
24×27=648*yd.*
£16 4*s.*=324*s.*
1 : 24 : : 324*s.* : whole cost.
Ans. { whole cost £388 16*s.*
cost per *yd.* 12*s.*

(17)

£5 12*s.*=112*s.*
yd. *yd.* *s.*
9 : 72 : : 112 : *Ans.*
Ans. £44 16*s.*

(18)

£146=2920*s.*
da. *da.* *s.*
365 : 1 : : 2920 : *Ans.*
Ans. 8*s.*

(19)

3 : 160 : : 2*yd.* : *Ans.*

Ans. 106*yd.* 2*ft.*

(20)

750 : 1200 : : 22500 : *Ans.*

Ans. 36000.

(21)

Since the product of the two sides of the board will ive its area, it follows that the area divided by one side ill give the other side. Now, since the area is 144 quare inches, and one side 9 inches, the other side is $\frac{144}{9}=16$ inches.

(22)

7*cwt.* 1*qr.*=29*qr.*

4*cwt.* 2*qr.*=18*qr.*

r. *qr.*

9 : 18 : : $64,96 : *Ans.*

Ans. $40,32.

(23)

£2831 5*s.*=56625*s.*

750 : 3500 : : 56625*s.* : *Ans.*

Ans. £13212 10*s.*

(24)

$27\times20=540$ total square feet of carpeting. But as ıe carpeting is to be 3 feet wide, the length must be ıual to $\frac{540}{3}=180ft.=\frac{180}{3}=60yd$

(25)

£1 14*s.* 6*d.*=414*d.*

bu. *bu.* *d.*

36 : 6 : : 414 : *Ans.*

Ans. 5*s.* 9*d.*

(26)

Since the stones are different only in length, it follows ıat to build the same amount of wall will require more ones of the shorter size: hence,

2 : 3 : : 6352 : *Ans.*

Ans. 9528 stones.

(27)

$1da. = 24hr. = 1440m.$

$m. \quad m.$
$2 : 1440 :: 300 : Ans.$

$Ans.\ 216000.$

(28)

$1124 : 536 :: 365da. : Ans.$

$Ans.\ 174\frac{16}{281}da.$

(29)

£763 15$s.$ = 15275$s.$ = 183300$d.$

3$s.$ 6$d.$ = 42$d.$

£1 = 240$d.$

$d. \quad d. \quad d.$
$240 : 42 :: 183300 : Ans.$

$Ans.$ £133 13$s.$ $1\frac{1}{2}d.$

(30)

\$1 : \$.004 :: \$3758 : $Ans.$

$Ans.$ \$15,032.

(31)

It can be done in $12 \times 4 = 48hr.$

Hence, $\frac{48}{6} = 8$ *days.*

$hr. \quad hr. \quad da.$
Or, $6 : 4 :: 12 : Ans.$

$Ans.$ 8 *days.*

(32)

90 guineas $= 90 \times 21 = 1890s.$

$s. \quad s. \quad bu.$
$6 : 1890 :: 1 : Ans.$

$Ans.$ 315 *bushels.*

(33)

£977 = 19540$s.$ = 234480$d.$

£420 6$s.$ $3\frac{1}{4}d.$ = 100875$\frac{1}{4}d.$

£1 = 20$s.$ = 240$d.$

$d. \quad d. \quad d.$
$234480 : 100875\frac{1}{4} :: 240 : Ans.$

$Ans.\ 103\frac{1}{4}d. = 8s.\ 7\frac{1}{4}d.$

(34)

2000 : 3000 : : 18*da.* : *Ans.*

Ans. 27 *days.*

(35)

600 × 21 = 12600*s.*

25*s.* 6*d.* × 365 = 9307*s.* 6*d.*

2|0)329|2 . . 6*d.*

Ans. £164 12*s.* 6*d.*

(36)

1*cwt.* 12*lb.* = 112*lb.*

112*lb.* × 30 = 3360*lb.*

16*s.* 4*d.* = 196*d.* cost of 100*lb.*

lb. *lb.* *d.*

100 : 3360 : : 196 : *Ans.*

Ans. £27 8*s.* $9\frac{3}{5}$*d.*

(37)

da. *da.* *lb.*

80 : 54 : : 2 : *Ans.*

Ans. $1\frac{7}{20}$*lb.*

(38)

$\frac{1}{2}$ *guinea* = 10*s.* 6*d.* = 126*d.*

£21 = 420*s.* = 5040*d.*

d. *d.* *wk.*

126 : 5040 : : 1 : *Ans.*

Ans. 40 *weeks.*

(39)

£ and in

186*d.*

6 : *Ans.*

ns. 18*s.* 6*d.*

(40)

2*s.* = 24*d.*

2*s.* 6*d.* = 30*d.*

30*d.* : 24*d.* : : 20 : Ans.

Ans. 16 bottles.

(41)

$21 \times 40 = 840yd.$

1.75

4200

5880

840

\$1470,00 what he received.

1260,00 what it cost.

Ans. \$210,00 *gain.*

(42)

There runs in $3gal.$ in $5m.$

There runs out $1gal.$ in $5m.$

Hence, the cistern fills at the rate of $2gal.$ in $5m.$

gal. gal. m.

2 : 200 : : 5 : *Ans.*

Ans. $500m. = 8hr.\ 20m.$

(43)

hr. hr. da.

15 : 12 : : $22\frac{1}{2}$: *Ans.*

Ans. 18 *days.*

(44)

$40 \times 3\frac{1}{2} = 140cwt.$ for 150 miles, costs \$42,

and for 50 miles $140cwt.$ will cost \$14,

and $10hhd.$ at $12cwt.$ each $= 120cwt.$

cwt. cwt. \$

Hence, 140 : 120 : : 14 : *Ans.*

Ans. \$12.

(45)

In one month 14 persons will spend \$140; 5 months \$140 × 5 = \$700.

Hence, 14 : 9 : : \$700 : *Ans.*

A = 8s. 7½d.

(46)

A goes 11 yards per minute, or 33 yards in 3 mins, while B goes 34 yards: hence, B gains 1 yard in minutes; and to gain $\frac{536}{2}$=268 yards, he must travel

$268 \times 3 = 804$ minutes.

m. *m.* *yd.* *yd.*
en, 3 : 804 :: 34 : 9112 distance travelled.

$9112 \div 536 = 17$ times round.

(47)

$73lb.\ 5oz.\ 15pwt. = 17635pwt.$;

$1oz. = 20pwt.$; $5s.\ 9d. = 69d.$

pwt. *pwt.* *d.*
20 : 17635 :: 69 : *Ans.*

Ans. £253 10*s.* $0\frac{3}{4}d.$

(48)

$8s.\ 4d. = 100d.$; $7s.\ 3d. = 87d.$

d. *d.* *oz.*
100 : 87 :: 8 : *Ans.*

Ans. $6oz.\ 15\frac{9}{25}dr.$

(49)

$173A.\ 2R.\ 14P. = 27774P.$

$1A. = 160P.$

£1 7*s.* $8d. = 332d.$

P. *P.* *d.*
160 : 27774 :: 332 : *Ans.*

Ans. £240 2*s.* $6\frac{1}{20}d.$

(50)

£2107 12*s.* − £500 = £1607 12*s.* = 32152*s.*

da. *da.* *s.*
365 : 1 :: 32152 : *Ans.*

Ans. £4 8*s.* $1\frac{12}{365}d.$

(51)

18 men will build $72 \div 4 = 18$ rods in 1 day;
and $18 \times 22 = 396$ rods in 22 days.
Then, 18 : 38 :: 396*rods* : *Ans.*
Ans. 836 *rods.*

(52)

$4000 \times 24 \times 7 \times 14 = 9408000$ total ounces.
$210 \times 200 \times 16 = 672000$ spoiled.
8736000 left.
$4000 \times 24 \times 7 = 672000$ number of rations.
$8736000 \div 672000 = 13oz.$ weight of rations.

(53)

If one-fourteenth was spoiled and 13*oz.* still left to each man, they would have had 14*oz.* had none been spoiled. Hence,
$4000 \times 24 \times 7 \times 14 = 9408000oz. = 588000lb.$ total weight.
$588000 \div 14 = 42000lb.$ spoiled.

(54)

The amount spoiled lessened the ration one ounce.
$4000 \times 24 \times 7 \times 14 = 9408000oz. = 588000lb.$ whole wt.
Spoiled $210 \times 200 = 42000lb.$
They received $546000lb.$

(55)

If they lose one-fourteenth and have 13*oz.* left, they would have had 14*oz.* had none been lost: hence,
$4000 \times 24 \times 7 \times 14 = 9408000oz. = 588000lb.$ total weight.
One-fourteenth of which is $42000lb.$

(56)

5000 : 3000 :: 30*da.* : *Ans.*

Ans. 18 *days.*

(57)

$2520=cost.

$42\times20\times3=\$2520$=amount it sold for.

(58)

$)\times6=1440$=days that 8*bar.* would supply 1 man.

14 :: 1440 : 2520=days 14*bar.* supply 1 man.

a, $2520\div126=20$=days it will supply 126 men.

(59)

is plain that the younger receives $\frac{1}{5}$ and the elder $\frac{4}{5}$.

ce, $2500\div5=\$500$ younger brother's part.

$2500\times\frac{4}{5}=\$2000$ elder brother's part.

(60)

7 years 50 persons consume $600\times7=4200bu.$

a, 50 : 278 :: 4200*bu.* : *Ans.*

Ans. 233520*bu.*

EXAMPLES INVOLVING FRACTIONS.

(2)

oz. *oz.* £

$\frac{5}{7}$: 1 :: $\frac{11}{12}$: *Ans.*

Ans. £1 5*s.* 8*d.*

(3)

$\frac{3}{16}$: $\frac{5}{32}$:: £273 2*s.* 6*d.* ; *Ans.*

Ans. £227 12*s.* 1*d.*

(4)

$3\frac{1}{2}=\frac{7}{2}$ *pieces*; $24\frac{1}{3}=\frac{73}{3}yd.$

$\frac{73}{3}\times\frac{7}{2}=\frac{511}{6}yd.$; $6s.\ \frac{1}{2}d.=72\frac{1}{2}d.=\frac{145}{2}d.$

yd.		*yd.*		*d.*		
1	:	$\frac{511}{6}$	::	$\frac{145}{2}$	:	*Ans.*

Ans. £25 14*s.* $6\frac{7}{12}d.$

(5)

$\$1\frac{1}{2}=\$\frac{3}{2}$.

lb.		*lb.*		$		
14	:	6	::	$\frac{3}{2}$	:	*Ans.*

Ans. $\$\frac{9}{14}$.

(6)

yd.		*yd.*		$		
$\frac{2}{5}$	:	$\frac{5}{2}$	::	$\frac{7}{9}$	:	*Ans.*

Ans. $\$4\frac{31}{36}$.

(7)

lb.		*lb.*		$		
2	:	30	::	$\frac{1}{8}$	:	*Ans.*

Ans. $\$1\frac{7}{8}$.

(8)

$14\frac{1}{2}yd.=\frac{29}{2}yd.$; $\$19\frac{1}{3}=\$\frac{58}{3}$; $19\frac{7}{8}yd.=\frac{159}{8}$.

yd.		*yd.*		$		
$\frac{29}{2}$	:	$\frac{159}{8}$	::	$\frac{58}{3}$	:	*Ans.*

Ans. $\$\frac{53}{2}=\$26\frac{1}{2}$.

(9)

.3 : .95 :: $100,75 : *Ans.*

Ans. $319,041+.

(10)

$\frac{3}{5}$: 1 :: $3724,16 : *Ans.*

Ans. $6206,93+.

(11)

$8\frac{1}{2}hr. = \frac{17}{2}hr.$; $4\frac{3}{4}hr. = \frac{19}{4}hr.$

Both fill in 1 hour $\frac{1}{\frac{17}{2}} + \frac{1}{\frac{19}{4}} = \frac{2}{17} + \frac{4}{19} = \frac{106}{323}$ of the cistern.

$\frac{106}{323}$: 1 :: $1hr.$: *Ans.*

Ans. $3hr.\ 2m.\ 49\frac{43}{53}sec.$

(12)

$1000 + 500 = 1500$ for $5wk.$ would give $\frac{1}{3}$ less,

or $\frac{2}{3}$ of $16oz. = \frac{32}{3}oz.$

wk. *wk.* *oz.*

8 : 5 :: $\frac{32}{3}$: *Ans.*

Ans. $6\frac{2}{3}oz.$

(13)

All will fill in 1 day, $\frac{1}{12} + \frac{1}{11} - \frac{1}{14} = \frac{95}{924}$;

$\frac{95}{924}$: 1 :: $1da.$: *Ans.*

Ans. $9\frac{69}{95}da.$

(14)

$23hr.\ 56m. = 1436m.$;

$\frac{15550}{14336}$ = number of miles it moves per minute.

m. *m.* *mi.*

1 : 60 :: $\frac{15550}{14336}$: *Ans.*

Ans. $649\frac{2550}{3584}mi.$

(15)

$1 - \frac{1}{4} = \frac{3}{4}$; $\frac{3}{7}$ of $\frac{3}{4} = \frac{9}{28}$; then, $\frac{1}{4} + \frac{9}{28} = \frac{16}{28} = \frac{4}{7}$;

$1 - \frac{4}{7} = \frac{3}{7} = £820$ what was left ;

$\frac{3}{7}$: 1 :: £820 : *Ans.*

Ans. £1913 6*s.* 8*d.*

(16)

$1 - \frac{1}{4} = \frac{3}{4}$; $\frac{1}{5}$ of $\frac{3}{4} = \frac{3}{20}$;

then, $\frac{1}{4} + \frac{3}{20} = \frac{8}{20} = \frac{2}{5}$ = what was spent,

and, $1 - \frac{2}{5} = \frac{3}{5} = 72$ *guineas* = what was left ;

then $\frac{3}{5}$: 1 :: 72 : *Ans.*

Ans. 120 guineas.

(17)

$1-\frac{7}{18}=\frac{11}{18}$: $\frac{7}{18}$ of $\frac{11}{18}=\frac{77}{324}$ 2d son's part.

$\frac{7}{18}-\frac{77}{324}=\frac{126-77}{324}=\frac{49}{324}=$£514 6*s*. 8*d*.=dif. of son's parts.

$\frac{7}{18}+\frac{77}{324}=\frac{126+77}{324}=\frac{203}{324}$ both sons' parts.

$1-\frac{203}{324}=\frac{121}{324}$= widow's part.

$\frac{49}{324}$: $\frac{121}{324}$:: £514 6*s*. 8*d*. : £1270 1*s*. $9\frac{11}{49}$*d*. *Ans*.

or, 49 : 121 :: £514 6*s*. 8*d*. : £1270 1*s*. $9\frac{11}{49}$*d*.

(18)

A in 7 hours rode $7\times1\frac{1}{2}=10\frac{1}{2}$ miles farther than B.

$100mi.-10\frac{1}{2}=89\frac{1}{2}mi.$; $89\frac{1}{2}\div2=44\frac{3}{4}$=number of miles B rode.

Hence, A rode $55\frac{1}{4}$ miles;

and $55\frac{1}{4}\div7=7\frac{5}{28}mi.$ A's rate;

$44\frac{3}{4}\div7=6\frac{1}{28}mi.$ B's rate.

(19)

$\frac{1}{9}+\frac{5}{6}=\frac{6+45}{54}=\frac{51}{54}$=part in mud and air.

$1-\frac{51}{54}=\frac{3}{54}=1$ foot=part in water.

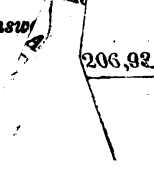
$\frac{3}{54}$: 1 :: 1 foot : *Ans*.

Ans. 18*ft*.

DOUBLE RULE OF THREE.

(4)

horses		*horses*		*A.*		
6	:	12	::	16	:	1*st answer*.
mo.		*mo.*				
4	:	9	::	—	:	*true answ*



(5)

men	*men*		$			
6	:	9	::	84	:	1*st answer.*
days	*days*					
14	:	11	::	—	:	*true answer.*

Ans. $99.

(6)

bu.	*bu.*		*horses*			
154	:	406	::	14	:	1*st answer.*
horses	*horses*		*da.*			
7	:	—	::	44	:	*true answer.*

Ans. 232 *days.*

(7)

$	$		*yr.*			
6250	:	11250	::	2	:	1*st answer.*
men	*men*					
5	:	25	::	—	:	*true answer.*

Ans. 18 *years.*

(8)

persons	*persons*		*bar.*			
7	:	42	::	1	:	1*st answer.*
da.	*da.*					
12	:	365	::	—	:	*true answer.*

Ans. 182*bar.* 18*gal.*

(9)

men	*men*		*A.*			
9	:	19	::	36	:	1*st answer.*
da.	*da.*					
4	:	11	::	—	:	*true answer.*

Ans. 209 *acres.*

(10)

persons	*persons*		*bu.*			
25	:	139	::	300	:	1*st answer.*
yr.	*yr.*					
1	:	7	::	—	:	*true answer.*

Ans. 11676 bushels.

(11)

men *men* *da.*
48 : 32 :: 4 : 1*st answer.*
S. ft. *S. ft.*
$36\times8\times4$: $864\times6\times3$:: – : *true answer.*
Ans. 36 *days.*

(12)

men *men* £
13 : 22 :: $7\frac{1}{2}$: 1*st answer.*
da. *da.*
$7\frac{1}{2}$: $17\frac{1}{3}$:: — : *true answer.*
Ans. £29 6*s.* 8*d.*

(13)

mi. *mi.* *da.*
298 : $157\frac{1}{8}$:: $8\frac{2}{3}$: 1*st answer.*
hr. *hr.*
$10\frac{2}{3}$: $12\frac{1}{2}$:: — : *true answer.*
Ans. $5\frac{27085}{76288}$*da.*

PRACTICE.

(4)

1000 at $\frac{1}{4}$*ct.* - - - - - - 4)1000
250*cts.*=$2,50.

(5)

900 at 6*cts.*=$900\times6=5400$*cts.*=$54,00.

(6)

20*lb.* at 6*cts.*=$20\times6=$ $1,20
20*lb.* at $\frac{1}{2}$*ct.* $=20\times\frac{1}{2}=$,1
20*lb.* at $\frac{1}{4}$*ct.* $=20\times\frac{1}{4}=$,
Total $1

(7)

140*yd.* at 2*cts.* = 140 × 2 = $2,80
140*yd.* at $\frac{1}{4}$*ct.* = 140 × $\frac{1}{4}$ = ,35
Total $3,15

(8)

438 at 31*cts.* = 438 × 31 = $135,78
438 at $\frac{1}{4}$*ct.* = 438 × $\frac{1}{4}$ = 1,09$\frac{1}{2}$
Total $136,87$\frac{1}{2}$

(9)

51 at $12 = 51 × 12 = $612,00
$\frac{1}{2}$ at $12 = $\frac{1}{2}$ × 12 = 6,00
Total $618,00

(10)

231 at 75*cts.* = 231 × 75 = $173,25.

(11)

144 at 3*d.* = 144 × 3 = 432*d.*
144 at $\frac{1}{2}$ = 144 × $\frac{1}{2}$ = 72*d.*
12)504
Ans. £2 2*s.* 42*s.*

(12)

14 at $4,75 = 14 × 4,75 = $66,50
$\frac{1}{4}$ at $4,75 = $\frac{1}{4}$ × 4,75 = 1,18$\frac{3}{4}$
Total $67,68$\frac{3}{4}$

(13)

131 at 1*s.* = 131*s.* = £6 11*s.* 0*d.*
131 at 2*d.* = 262*d.* = 1 1*s.* 10*d.*
Total £7 12*s.* 10*d.*

(14)

144 at 1*s.* = 144*s.* = £7 4*s.*
144 at 3*d.* = 432*d.* = 1 16*s.*
Total £9 00*s.*

(15)

1 quart, - - - - - - -			5*s.* 4*d.*
			4
cost of 1 gallon, - -	£1	1	4
			6
cost of 6 gallons, - -	£6	8	0
add cost of 1 quart, - -		5	4
1 pint $=\frac{1}{2}$ quart, - - -		2	8
2 gills $=\frac{1}{2}$ pint, - - -		1	4
Total	£6	17*s.*	4*d.*

(16)

51 at £3 = 51 × 3 =	£153		
51 at 2*s.* = 102*s.* =	5	2*s.*	
51 at 2*d.* = 102*d.* =		8*s.*	6*d.*
Total	£158	10*s.*	6*d.*

(17)

15*cwt.* at 1*s.* per *lb.*	= 100 × 15 × 1	=	£75	0*s.*	
2*qr.* at 1*s.* "	= 50 × 1	=	2	10	
17*lb.* at 1*s.* "	= 17 × 1	=		17	
	Total		£78	7*s.*	

(18)

	£	*s.*	*d.*
cost of 1 yard	2	3	8
cost of $\frac{1}{4}$ yard		10	11
cost of 1 *E. E.*	2	14*s.*	7*d.*
			4
4 *E. E.*	£10	18*s.*	4*d.*
3*qr.* of a yard	1	12	9
2*na.* = $\frac{1}{2}$*qr. yd.*		5	$5\frac{1}{2}$
Total	£12	16*s.*	$6\frac{1}{2}$*d.*

(19)

1*hhd.* 2*gal.* 3*qt.* = 263*qt.*	
263*qt.* at 12*cts.*	$31,56
263*qt.* at $\frac{1}{2}$*ct.* -	1,31$\frac{1}{2}$
1*pt.* = $\frac{1}{2}$ quart -	6$\frac{1}{4}$
1*gi.* = $\frac{1}{4}$ pint -	1$\frac{2}{4}$
Total	$32,95$\frac{6}{4}$

(20)

	£	s.	d.	far.
. at 10s. =270s. - - - - - -	13	10	00	
. at 2d. = 54d. - - - - - -		4	6	
. at 3far.= 81far. - - - - -		1	8	1

4)10s. 2d. 3far.

. costs 2s. 6d. $2\frac{3}{4}$far.	3pk.-cost	7	8	$0\frac{1}{4}$
costs 3d. $3\frac{1}{32}$far.	6qt. cost	1	11	$0\frac{2}{32}$
$=\frac{1}{2}$qt. costs 1d. $3\frac{43}{64}$far.			1	$3\frac{43}{64}$
	Total £14	5	11	$0\frac{63}{64}$

(21)

120lb. at 6cts.=120×6=	$7,20
120lb. at $\frac{1}{2}$ct. =120×$\frac{1}{2}$=	,60
120lb. at $\frac{1}{4}$ct. =120×$\frac{1}{4}$=	,30
Total	$8,10

(22)

d. 5gal. 3qt.=527qt.	
. at 12cts.=	$63,24
. at $\frac{1}{2}$ct. =	2,63$\frac{1}{2}$
$=\frac{1}{2}$pt.=$\frac{1}{4}$qt. -	031
Total	

[redacted]

. [illegible]. 3qt.=263qt.	
. at 56cts.=	$147,28
. at $\frac{1}{4}$ct. =	,65
.=$\frac{1}{2}$qt. - -	,28
.=$\frac{1}{4}$pt. - -	,07
Total	$148,28+

(23)

376yd. at $1=	$376
376yd. at $$\frac{1}{2}$=	188
376yd. at $$\frac{1}{4}$=	94
Total	$658

(25)

85yd. at $9,50=	$807,50
$\frac{1}{2}$yd. at $9,50=	4,75
Total	$812,25

(26)

27*bu.*	at $1 =	$27,00
27*bu.*	at $\frac{1}{2}$ =	13,50
27*bu.*	at $\frac{1}{4}$ =	6,75
3*pk.* = $\frac{3}{4}$*bu.*		1,312+
6*qt.* = $\frac{3}{4}$*pk.*		,328+
1*pt.* = $\frac{1}{2}$*qt.*		,027+
	Total	$48,917+

PERCENTAGE.

ART. 199.

(1)

	$
	852
	.05
Ans.	$42,60

(2)

	bar.
	1200
	.64
	768.00
Ans.	432

(3)

	hhd.
	1200
	.03$\frac{1}{2}$
	3600
	600
	42.00
Ans.	42*hhd.*

(4)

	24
	.14
	960
	240
	$33,60

	$
	240
	18$\frac{1}{2}$
	1920
	240
	120
	44,40
	33,60
Ans.	$10,80

(5)

$800 $1050
05½ 06½
4000 6300
400 525
$44,00 $68,25
44,00
Ans. $24,25

ART. 200.

(1)

$\frac{82.75}{550}=15\frac{1}{22}$.

Ans. $15\frac{1}{22}$ *per cent.*

(2)

$1500 $1500
.20 300
$300,00 1200

$\frac{66000}{1200}=55$.

Ans. 55 *per cent.*

(3)

$\frac{6000}{300}=20$.

Ans. 20 *per cent.*

(4)

$837,996
698,330
139,666

$\frac{139.6660}{698.33}=20$.

Ans. 20 *per cent.*

(5)

$837,996
698,330
139,666

$\frac{139.66600}{837.996}=16\frac{2}{3}$.

Ans. $16\frac{2}{3}$ per cent.

TARE AND TRET.

(4)

	T.	*cwt.*	*qr.*	*lb.*		*lb.*
No. 1 - -		9	3	25	- - tare	146
" 2 - -		10	2	12	- - "	150
" 3 - -		11	1	25	- - "	158
Gross *wt.* -	1	12	0	12		454 = 4*cwt.* 2*qr.* 4*lb.*
		4	2	4		
	1	7	2	8		

1*T.*	at $9,47	per *cwt.*	= $9,47 × 20 =	$189,40
7*cwt.*	at $9,47	"	= 9,47 × 7 =	66,29
2*qr.*	at $9,47	"	= 9,47 × ½ =	4,735
8*lb.*	at $9,47	"	= 9,47 × .08 =	,7576
			Total cost	$261,1826

(5)

	cwt.	*qr.*	*lb.*
No. 1 - -	10	3	6
" 2 - -	12	5	2
" 3 - -	13	1	10
" 4 - -	11	2	7
Gross - -	49	0	0
Tare - -	1	3	21
Net *wt.* -	47	0	4

	cwt.
	49
	4
Tare on 49*cwt.* at 4*lb.*	196*lb.*
or, 1*cwt.* 3*qr.* 21*lb.*	

47*cwt.* at £1 - - - - - - - - - - - - -	£47	
47*cwt.* at 5*s.* = 235*s.* - - - - - - - - - -	11	15*s.*
4*lb.* = $\frac{4}{100}$*cwt.* = $\frac{1}{25}$*cwt.*; $\frac{1}{25}$ of £1 5*s.*		1
Total cost	£58	16*s.*

(6)

	cwt.	*qr.*	*lb.*		*lb.*
No. 1	6	2	14	tare	94
" 2	9	1	20	"	100
" 3	6	2	22	"	88
" 4	7	2	25	"	89
" 5	8	0	13	"	100
Gross *wt.*	38	2	19		471

38*cwt.* 2*qr.* 19*lb.*=3869*lb.*
Tare 471
3398*lb.* at 21*cts.* per *lb.*

Then, 3398×21=$713,58. *Ans.*

(7)

cwt.	*qr.*	*lb.*		*cwt.*	*qr.*	*lb.*
8	0	5	Gross *wt.*	161	0	0
		20	Tare	19	1	7
161	0	0	Net *wt.*	141	2	18

	£	*s.*	*d.*
141*lb.* at £7	987	0	0
141*lb.* at 5*s.*	35	5	0
2*qr.*=½*cwt.* at £7 5*s.*	3	12	6
18*lb.*=.18 of 1*cwt.* at £7 5*s.*	1	6	1.2
Total cost	927	3	7.2

SIMPLE INTEREST.

CASE I.

(4)

$650
.06
Ans. $39,00

(5)

$950
.07
66,50
4
Ans. $266,00

(6)

$3675
.07
257,25
3
Ans. $771,75

(7)

$459
8 × .05 = .40
Ans. $183,60

(8)

$375,273
.07
26,26911
2
Ans. $52,53822

(9)

$211,26
.04½
84504
10563
Ans. $9,5067

(10)

$1576,91
.07
110,3837
3
Ans. $331,1511

(11)

$957,08
6 × .035 = .210
957080
191416
Ans. $200,98680

(12)

$375,45
.07
26,2815
7
Ans. $183,9705

(13)

$4049,87
2 × .05 = .10
Ans. $404,9870

(14)

$16199,48
16 × .05½ = .88
12959584
12959584
Ans. $14255,5424

CASE II.

(3)

$8975
.05
Ans. $448,75

(4)

$8753,65
.07
Ans. $612,7555

(5)

$37596,42
.08
Ans. $3007,7136

(6)

$3976,85
.045
1988425
1590740
Ans. $178,95825

(7)

$17507,30
.07
Ans. $1225,5110

(8)

$75192,84
.08
Ans. $6015,4272

(9)

$15907,40
.13½
477222
159074
79537
Ans. $2147,499

(10)

$84377,91
.03½
42188955
25313373
Ans. $2953,22685

(11)

$31573,25
.05
Ans. $1578,6625

CASE III.

(3)

$575,72
29
518148
115144
6)1669588
Ans. $2,78264+

(4)

$195,19
.001⅙
19519
3253+
Ans. $0,22772

(5)

$897,04
.004½
358816
44852
Ans. $4,03668

(6)

$378,53
.003
Ans. $1,13559

(7)

$885,62
.004$\frac{1}{6}$
354248
14760+
Ans. $3,69008+

(8)

$3756,25
17
2629375
375625
6)6385625
Ans. $10,64270+

(9)

$981,90
70
6)6873300
Ans. $11,45550

(10)

$11268,75
17
7888125
1126875
6)19156875
Ans. $31,928125

(11)

$4428,10
165
221405
265686
44281
6)73063650
Ans. $121,77275

(12)

$975,95
.002$\frac{1}{3}$
195190
32531+
Ans. $2,27721+

CASE IV.

(2)

$11759,10
.06
705,5460
9*yr.*
$6349,9140

$11759,10
$\frac{1}{2}$ the mo.
.05$\frac{1}{2}$
5879550
587955
$646,7505

$11759,10
16
705546
117591
6)1881456
$31,3576

(2) CONTINUED.

Interest for 9 years - - - - -	$6349,9140
" " 11 months - - - - -	646,7505
" " 16 days - - - - -	31,3576
Total interest	$7028,0221

(3)

$9787 - - - 6)9,787
.06 1,631+
587,22
12yr. Interest for 12 years - - $7046,64
$7046,64 " " 1 day - - - 1,631+
Total interest $7048,271+

(4)

$87601,29 $87601,29
.06 ½ the mo. ½ 6)87,60129
$5256,0774 for 1yr. $438,0064+ 14,60021+

Interest for 1 year - - - - -	$5256,0774
" " 1 month - - - -	438,0064+
" " 1 day - - - - -	14,6002+
Total interest	$5708,6840+

(5)

$806,90 $806,90
.06 .05
$48,4140 for 1yr. $40,3450

Interest for 1 year - - - - - - -	$48,4140
" " 10 months - - - - - -	40,3450
Total interest	$88,7590

(6)

$450,75	$450,75
.06	.03½
$27,0450	135225
4*yr.*	22537+
$108,1800	$15,7762

Interest for 4 years - - - - - - - - $108,1800
" " 1 month - - - - - - - 15,7762
Total interest $123,9562

(7)

$443,50	$443,50	$443,50
.06	.01	.002
$26,6100	4,4350	,88700
7*yr.*		
$186,2700		

Interest for 7 years - - - - - - - - 186,2700
" " 1 month - - - - - - - - 4,4350
" "12 days - - - - - - - - - ,8870
Total interest $191,5920

(8)

$649,22	$649,22
.60	.05
$389,5320	$32,4610

Interest for 10 years - - - - - - - $389,532
" " 10 months - - - - - - 32,4610
Total interest - - - $421,9930
Principal - - - - - - 649,22
Amount - - - - - $1071,2130

(9)

Multiplier for 14 years = .06 × 14 = .84
" " 4 months - - - - - - .02
" " 24 days - - - - - - - .004
Entire multiplier .864

$1330,50
.864
53220
79830
106440
Ans. $1149,5520

CASE V.

(3)

Multiplier for 5 years = .06 × 5 = .30
" " 2 months - - - - - .01
" " 9 days - - - - - - .0015
Entire multiplier .3115

$987,99
.3115
493995
98799
98799
296397
6)307.758885
51.2931475
Ans. $256,4657375

(4)

$437,21
.54
174884
218605
$236,0934

$437,21
.04½
174884
218605
$19,67445

Interest for 9 years - - - - - $236,0934
" " 9 months - - - - - - 19,67445
2)255,76785
127,883925
Ans. $127,883925

(5)

$15000	$600 interest for 8 months.
.04	100 add one-sixth.
$600,00	$700 total interest.

(6)

$400	$1,40 interest for 21 days.
.003½	,233+ subtract one-sixth.
1200	$1,167 total interest.
200	
$1,400	

(7)

$876,48	$876,48	$876,48
.06	.04½	.002⅓
52,5888	350592	175296
4	43824	29216
$210,3552	$39,4416	$2,04512

Interest for 4 years	$210,3552
" " 9 months	39,4416
" " 14 days	2,0451+
	6)251,8419
Add one-sixth	41,9736+
Total interest	$293,8155+

(8)

$1119,48	Int. for 2½*yr.* at 6 per *ct.*	$167,922
.06	Add one-sixth	27,987
$67,1688	Total interest	$195,909
2	Principal	$1119,48
$134,3376	Amount	$1315,389
33,5844 for ½*yr.*		
$167,9220		

(9)

$532,41	$532,41
.06	.01½
$31,9446	53241
3*yr.*	26620+
$95,8338	$7,9861+

Interest for 3 years - - - - - - $95,8338
" " 3 months - - - - - 7,9861+
4)103,8199
Subtract one-fourth - - - - - - 25,9549+
Total interest $77,8650+

(10)

$8375,27	$8375,27	6)8,37527
.06	.02½	1,39587+
502,5162	1675054	5
5*yr.*	418763+	$6,97935
512,5810	$209,3817+	

Interest for 5 years - - - - - $2512,5810
" " 5 months - - - - 209,3817+
" " 5 days - - - - - 6,9793+
Interest at 6 per *ct.* - - - - - 6)2728,9420
Subtract one-sixth - - - - - - 454,8236+
Interest at 5 per *ct.* - - - - - $2274,1184+

(11)

ltiplier for 1 year	= .06	$8759,27
" " 6 months	= .03	.0915
" " 9 days	= .0015	4379635
Entire multiplier	.0915	875927
		7883343
		Ans. $801,478205

(12)

$7569,11	$7569,11	$7569,11
.18	.02	.003
6055288	$151,3822	$22,70733
756911		
$1362,4398		

Interest for 3 years - - - -	$1362,4398
" " 4 months - - - -	151,3822
" " 18 days - - - - -	22,7073+
Total interest at 6 per *ct.* -	12)1536,5293
Add one-twelfth - - - - - -	128,0441+
Total interest at 6½ per *ct.* -	$1664,5734+

ART. 210.

(3)

$132,26	Int. for 1 year $7,9356
.06	" 4 months 2,6452
3)7,9356 int. for 1*yr.*	" 10 days 0,2204+
4)2,6452 int. for 4*mo.*	Total interest $10,8012+
3)0,6613 int. for 1*mo.*	
0,2204+int. for 10*da.*	

(4)

$25,50	Int. for 1*yr.* $1,5300
.06	" 9*mo.* 1,1475
4)$1,5300 int. for 1*yr.*	" 10*da.* 0,0425
0,3825 int. for 3*mo.*	" 2*da.* 0,0085
9)1,1475 int. for 9*mo.*	Total int. $2,7285
3),1275 int. for 1*mo.*	
5),0425 int. for 10*da.*	
,0085 int. for 2*da.*	

(5)

$347,25
.06
12)20,8350 int. for 1*yr.*
5)1,7362+ int. for 1*mo.*
0,3472+ int. for 6*da.*

Int. for 1*yr.* $20,8350
" 1*mo.* 1,7362+
" 6*da.* 0,3472+
Int. at 6 per *ct.* $22,9184+

Int. at 6 per *ct.* - - -	$22,9184
Int. at 1 per *ct.* is $\frac{1}{6}$	3,8197+
Int. at half per *ct.* is -	1,9098+

Int. at 6 per *ct.* - - -	$22,9184
Add int. at 1 per *ct.* -	3,8197
Int. at 7 per *ct.* - - -	$26,7381

Int. at 6 per *ct.* - - -	$22,9184
Sub. twice int. at 1 per *ct.* - - - -	7,6394
Int. at 4 per *ct.* - - -	$15,2790

Int. at 6 per *ct.* - - -	$22,9184
Add int. at 1 per *ct.* -	3,8197
Add int. at $\frac{1}{2}$ per *ct.* -	1,9098
Int. at 7$\frac{1}{2}$ per *ct.* - -	$28,6479

Int. at 6 per *ct.* - - -	$22,9184
Sub. int. at 1 per *ct.* -	3,8197
Int. at 5 per *ct.* - - -	$19,0987

Int. at 6 per *ct.* - - -	$22,9184
Add twice int. at 1 per *ct.*	7,6394
Int. at 8 per *ct.* - - -	$30,5578
Add int. at $\frac{1}{2}$ per *ct.* -	1,9098

Int. at 6 per *ct.* - - -	$22,9184
Sub. int. at $\frac{1}{2}$ per *ct.* -	1,9098
Int at 5$\frac{1}{2}$ per *ct.* - - -	$21,0086

Int. at 8$\frac{1}{2}$ per *ct.* - -	$32,4676
Add int. at $\frac{1}{2}$ per *ct.* -	1,9098
Int. at 9 per *ct.* - - -	$34,3774

(6)

$48,32
.08
12)$2,8992 int. for 1*yr.*
2)0,2416 int. for 1*mo.*
0,1208 int. for 15*da.*

Int. for 1*yr.* - - $2,8992
" 1*mo.* - - 0,2416
" 15*da.* - - 0,1208
Total interest $3,2616

(7)

$675,87
.08
2)$54,0696 int. for 1*yr.*
6)27,0348 int. for 6*mo.*
5)4,5058 int. for 1*mo.*
0,9011+ int. for 6*da.*

3 times int. for 1*yr.* = $162,2088
int. for 6*mo.* - - - 27,0348
int. for 6*da.* - - - 0,9011
Total interest $190,1447

(8)

$587,25
.07
12)$41,1075 int. for 1*yr.*
6)3,4256+int. for 1*mo.*
0,5709+int. for 5*da.*

5 times int. for 1*yr.* = $205,5375
5 times int. for 1*mo.* 17,1280
int. for 5*da.* - - - 0,5709
Total interest $223,2364

(9)

$67589,20
.05
4)3379,4600 int. for 1*yr.*
3)844,8650 int. for 3*mo.*
5)281,6216+ int. for 1*mo.*
56,3243+ int. for 6*da.*

3 times int. for 1*yr.* = $10138,3800
3 times int. for 3*mo.* 2534,5950
twice int. for 6*da.* 112,6486
Total interest $12785,6236

CASE VI.

(2)

£67 19*s.* 6*d.* = £67.975.

£67.975
.18
543800
67975
£12.23550

£67.975
.04
£2.71900

£67.975
16
407850
67975
6)1087600
£.181266+

Interest for 3 years - - - £12.23550
" " 8 months - - 2.71900
" " 16 days - - - .18126+
Total interest £15.13576+
Which is equal to £15 2*s.* 8½*d.*+

(3)

£127 15*s.* 4*d.* = £127.7666+.

£127.7666
.06
4)£7.665996 1*yr.*
1.916499 3*mo.*

3 times int. for 1*yr.* = £22.997988
int. for 3*mo.* = 1.916499
Total interest £24.914487
Equal to £24 18*s.* 3¼*d.*+

(4)

$107 16s. 10d.=£107.8416+.

107.8416		3 times int. for 1yr. =	£19.411488
.06		int. for 6mo. =	3.235248
6.470496	int. for 1yr.	int. for 6da. =	0.107841
3.235248	int. for 6mo.	Total interest	£22.754577
0.539208	int. for 1mo.	Equal to	£22 15s 1d.+
0.107841+	int. for 6da.		

(5)

£279 13s. 8d.=£279.6833+

.05¼

13984165

699208.+

Interest for 1yr. £14.683373

3

44.050119

Interest for ½yr. 7.341686+

£51.391805

Equal to - - - - £51 7s. 10d.+

Principal - - - £279 13s. 8d.

Amount £331 1s. 6d.+

27

A .0

and 27.

for 62

(6)

£14 10s. 2d.=£514.5083+

.04

st for 1yr. £20.580332

er of years 3½

61.740996

10.290166

nterest - - £72.031162=£72 0s. 7¼d.+

(7)

£523 11*s*. 6*d*. = £523.575
.06
£31.41450
$3\frac{1}{2}$
£94.24350
$\frac{1}{2}$ year 15.70725
£109.95075 = £109 19*s*. 0*d*.+

(8)

£255 10*s*. 8*d*. = £255.5333+
.06
£15.331998
6
£91.991988
$\frac{1}{2}$ year 7.665999
£99,657987 = £99 13*s*. $1\frac{3}{4}$*d*.+

APPLICATIONS.

(1)

This note has 5 months and nine days to run, so the interest must be calculated for that time and added to the principal, in order to find how much will then be due.

$127,50
.02$\frac{1}{2}$
25500
6375
Int. for 5*mo*. $3,1875

$1[illegible],50
.01$\frac{1}{2}$
Int. for 5*mo*. 3,[illegible]
Int. at 6 per *ct*. 3,[illegible]
add $\frac{1}{6}$ [illegible]97988
3,[illegible]16499
Principal 127,[illegible]14487
Amount $131,[illegible]$3\frac{1}{4}$*d*.+

(2)

The interest on this note must be reckoned for 2 years 4 months and 3 days.

$306	$306	2)$306
.06	.02	,153
18,36	6,12	
2		
36,72		

Interest for 2 years - - - -	$36,72
" " 4 months - - -	6,12
" " 3 days - - - -	,153
Principal - - - - - - - - -	306,000
Amount when due	$348,993

(3)

Six months after date is January 3d, 1838.
Interest from - - - January 1st, 1837.
Gives interest for 1 year and 2 days.

$1040	$1040	$62,40
.06	2	.3466
$62,40	6)2080	62,7466
	.3466+	add $\frac{1}{6}$ 10,4577+
		73,2043
	Principal	1040,0000
	Amount	$1113,2043+

(4)

As the note begins to draw interest March 1st, 1833, and is due July 4th, 1835, the interest must be computed for that time, which is 2 years 4 months and 3 days.

$612	$612	$612
.12	.02	.00½
$73,44	$12,24	$0,306

Interest for 2 years - - - -	$73,44
" " 4 months - - -	12,24
" " 3 days - - - -	,306
Principal - - - - - - - - -	612,000
Amount	$697,986

NEW YORK RULE.

(2)

Principal on int. from Feb. 6th, 1825 - -		$3469,3200
Int. to May 16th, time of 1st payment 3*yr.* 3*mo.* 10*da.*	$682,2996	
Payment, May 16th, 1828, less than int. then due	$545,7600	
Int. to May 16th, 1830, 5*yr.* 3*mo.* 10*da.* -		$1098,6180
Amount - - -		$4567,9380
1st payment, May 16th, 1828,	$545,76	
2d " May 16th, 1830,	$1276,00	
This sum, exceeding the int. then due, is to be taken from the amount - - - -	$1821,76 -	$1821,7600
Remainder for new principal - - - - - -		$2746,1780
Int. on $2746,1780, from May 16th, 1830, to Feb. 1st, 1831, 8*mo.* 16*da.*		$ 117,1702+
Amount - - -		$2863,3482
Payment 1st February, 1831 - - - - - -		$2074,7200
Remainder for new principal - - - - - -		$ 788,6282
Int. on $788,6282 from 1st Feb., 1831, to Aug. 11th, 1832, 1*yr.* 6*mo.* 10*da.*		$ 72,3899+
Amount due August 11th, 1832 - - - -		$ 861,0181

(3)

Principal on int. from Sept. 5th, 1817 - -		$635,8400
Int. from Sept. 5th, 1817, to Nov. 13th, 1819, 2*yr.* 2*mo.* 8*da.* - - - - - - - -		$ 83,5069
Amount - - -		$719,3469
Payment, Nov. 13th, 1819 - - - - - - -		$416,0800
Remainder for new principal - - - - - -		$303,2669
Int. on $303,2669 from Nov. 13th, 1819, to May 10th, 1820, 5*mo.* 27*da.*		$ 8,9463+
Amount - - -		$312,2132
Payment, May 10th, 1820 - - - - - - - -		$152,0000
Remainder for new principal - - - - - -		$160,2132
Int. on $160,2132 from May 10th, 1820, to March 1st, 1821, 9*mo.* 22*da.*		$ 7,7969+
Amount due - - -		$168,0101

(6)

105 : 100 :: 708,75
100
105)70875,00(675
630
787
735
525
525

45)675(15 *Ans.*
45
225
225
Ans. 15 *tons.*

(7)

102½ : 100 :: $28750
100
2875000

102½)2875000
2
205)5750000(28048,78+
410
1650
1640
1000
820
1800
1640
1600
1435
1650
1640
10

(8)

167 × 200 = $33400
rate per *ct.* .25
167000
66800
8350,00
Stock at par 33400
Value $41750

(9)

167 × 200 = $33400
10 per *ct.* 3340
Ans. $30060

(10)

$200 \times 100 = \$20000$

$18\frac{1}{2}$ per *ct.* = 3700,00

Stock 20000,

Ans. $23700,00

(11)

Amount of bills $267581

$.09\frac{1}{2}$

$2408229

$13379 0\frac{1}{2}$

Ans. $25420,19\frac{1}{2}$

(12)

$125 \times 69 = \$8625$

$.08

Discount - - - - $690,00

Capital stock - - $8625

Discount - - - - 690

Value $7935

(13)

$1000

$.02

$20,00

$1000

20

980

$.01\frac{1}{2}$

$980,00 980

14,70 490

Ans. $965,30 14,70

(14)

$2000

$.02\frac{1}{4}$

4000

500

$45,00

$2000

45

Ans. $1955

(15)

$6910,80

$.02\frac{1}{2}$

1382160

345540

$172,7700

$6910,80

172,77

Ans. $6738,03

(16)

$7380	95)7121.70(74.96526+
.03½	665
22140	471
3690	380
258,30	917
	855
$7380,00	620
258,30	570
7121,70	500
	475
	250
	190
	600
	570
	30

74.96526+ *T.*=74*T.* 19*cwt.* 1*qr.*5½*lb.*+ *Ans.*

LOSS AND GAIN.

(3)

1*hhd.*=63*gal.* at $1,25 per *gal.* - -	$78,75
Sold for - - - - - - - - - - - - - -	78,00
Loss - - - - - - - - - - - - - -	$0,75

(4)

Paid for wheat	$3517,10	3275)3165,39($0,96+
10 per *ct.* off	351,71	294 75
	$3165,39	21789
		19650
		2139

EXAMPLES.

(1)

$1,25
.20
$,2500

1,25—,25=$1,00 *Ans.*

(2)

125 at $0,75, cost - $93,75
20 per *ct.* of which is 18,75
He receives - - - $112,50

(3)

Cost - - - - - $725
15 per *ct.* - - 108,75
It is to bring - $833,75

1 tun=4*hhd.*=252*gal.*
4)833,75(
Ans. $208,4375

(4)

158*yd.* at 20*cts.* per *yd.* - $31,60
half cost - - - - - - - - - 15,80
19 per *ct.* gain, on $15,80 $3,002
6 per *ct.* loss, on $15,80 0,948
Ans. $2,054

(5)

20—16=4;
$\frac{400}{16}$=25.
Ans. 25 per *ct.*

(6)

If 4*s.* gain 9*d.*, how much will £100 gain?
4*s.* : 2000*s.* : : 9*d.* : 4500*d.*
4500*d.*=£18 15*s.* *Ans.*

(7)

12—10=2*cts.*=gain per *lb.*
650×2=$13,00=whole gain.
$\frac{200}{10}$=20; 20 per *ct.*=gain.

(8)

$1,25
.18
1000
125
0,2250

$1,250
225
Ans. $1,025

(9)

50—10=40*gal.*=what remained.
.75×50=$37,50=cost;
37,50×.10=$3,750;
37,50+3,75=$41,25;
$41,25—40=$1,031¼ *Ans.*

(10)

$35 \times .04 = \$1,40$

$\$35 - 1,40 = \$33,60$

$\$33,60 - \$30 = \$3,60 = \text{gain.}$

(11)

$67yd. - 19yd. = 48yd.$

$\$112 \times .05 = \$5,60$;

$\$112 - \$5,60 = \$106,40$;

$\$106,40 \div 48 = \$2,216\frac{2}{3}$.

(12)

$112 with 5 per cent off = $106,40: then,

$\$106,40 \div \$2,216\frac{2}{3} = 48yd.$: then,

$67 - 48 = 19yd.$ *Ans.*

BANK DISCOUNT.

ART. 230.

(1)

	$1000
$\frac{6}{6}\frac{3}{}=$	.0105
Ans.	$10,5000

	$15720
	.03
	471,60
	7,86
Discount	$479,46

(2)

	$15720
	.000$\frac{1}{2}$
	$7,860

	$15720,00
	479,46
Ans.	$15240,54

(3)

	$556,27
$\frac{6}{6}\frac{3}{}=$	.0105
	278135
	55627
Ans.	$5,840835

(4)

	$3456
	.01$\frac{1}{2}$
	3456
	1728
	$51,84

	$3456
	.000$\frac{1}{2}$
	1,728
	51,84
	53,568
add $\frac{1}{6}$	8,928
	$62,496

	$3456,000
	62,496
Ans.	$3393,504

(5)

$367,47
.07
12)$25,7229 int. for 1*yr.*
2,1435+int. for 1*mo.*
$367,47
16
220482
36747
6)587952
,97992
add $\frac{1}{6}$,16332
$1,14324 int. for 16*da.*

$25,7229 int. for 1
2,1435+int. for
1,1432+int. for
$29,0096+total disc

(6)

This note is due Nov. 20. It has therefore 3 m and 20 days to run from the 1st of August, whe discounted.

$6579,15
.01$\frac{1}{2}$
657915
3289575
$98,68725 int. for 3*mo.*

$6579,15
.003$\frac{1}{3}$
1973745
219305
$21,93050 int. for 2

$98,687+$21,930+=$120,617+ total discou

Art. 231.

(2)

Int. on $1 for the time, 1*yr.* 6*mo.* 17*da.*=$0,108
$1−,1083$\frac{1}{18}$=,8916$\frac{17}{18}$=$\frac{16,0505}{18}$;
$307,27÷$\frac{16,0505}{18}$=$344,59+= face of note

(3)

Interest on $1 for 8*mo.* 15*da.*=,0495$\frac{5}{6}$.
$1−,0495$\frac{5}{6}$=,9504$\frac{1}{6}$=$\frac{5,7025}{6}$;
$5450÷$\frac{5,7025}{6}$=$5434,32+= face of note.

(4)

The note, 6 months and 9 days from July 18th, is due Jan. 30th. It therefore has 5 months and 29 days to run from Aug. 1st.

Interest on \$1 for 5*mo.* 29*da.* $=,029\frac{5}{6}$.

$\$1-,029\frac{5}{6}=,970\frac{1}{6}=\frac{5,821}{6}$;

$\$674,89\div\frac{5,821}{6}=\$695,64+=$ face of note.

(5)

This note being due Nov. 16th, has 1 month and 15 days to run from Oct. 1st.

Int. on \$874,57 for $1\frac{1}{2}$*mo.* at 5 per *ct.* $=\$5,466+$.

$\$874,57-\$5,466=\$869,104$; then,

$\$869,104-\$750,25=\$118,85+$.

(6)

Interest on \$1 for 4*mo.* 10*da.* $=,021\frac{1}{3}$.

$\$1-,021\frac{1}{3}=,978\frac{2}{3}=\frac{2,936}{3}$;

$\$1475,50\div\frac{2,936}{3}=\$1507,663+=$face of note.

(7)

The note dated May 16th is due Nov. 19th. From June 1st to Nov. 19th is 5*mo.* 18*da.*

Interest of \$1 for 5*mo.* 18*da.* $=,032\frac{2}{3}$.

$\$1-,032\frac{2}{3}=\$0,967\frac{1}{3}=\frac{2,902}{3}$;

$\$1683,75\div\frac{2,902}{3}=\$1740,60+=$face of note.

(8)

Interest on \$1 for 1 year and 3 days $=,050\frac{5}{12}$.

$\$1-,050\frac{5}{12}=,949\frac{7}{12}=\frac{11,350}{12}$;

$\$1004,20\div\frac{11,350}{12}=\$1057,51+=$face of note.

(9)

Interest on \$1 for 4*mo.* 3*da.* $=,0239\frac{1}{6}$.

$\$1-,0239\frac{1}{6}=,9760\frac{5}{6}=\frac{5,856\,5}{6}$;

$\$367,464\div\frac{5,856\,5}{6}=\$376,46+=$face of note.

DISCOUNT.

(2)

$1 + its interest for 11*mo.* at 7 per *ct.* = $1,06$\frac{5}{12}$ = $\frac{12.71}{12}$;
$1651,50 ÷ $\frac{12.71}{12}$ = $1551,918+.

(3)

£1 + its interest for 15*mo.* = £1.0625;
£36 ÷ £1.0625 = £33 17*s.* 7$\frac{3}{4}$*d.*+.

(4)

$1 + its interest for 6*mo.* = $1,03;
$900 ÷ 1,03 = $873,786+.
$1 + its interest for 1 year = $1,06;
$2700 ÷ $1,06 = $2547,169+.
$1 + its interest for 18*mo.* = $1,09;
$3900 ÷ $1,09 = $3577,981+.
$1 + its interest for 2 years = $1,12;
$3000 ÷ $1,12 = $2678,571+.
$873,786 + 2547,169 + 3577,981 + 2678,571 =
$9677,507.

(5)

£1 + its interest for 6*mo.* = £1.035;
£2250 ÷ £1.035 = £2173.913+.
£1 + its interest for 1 year = £1.07;
£2250 ÷ 1.07 = £2102.803+.
£2173.913 + 2102.803 = £4276.716 = present value.
£4500 − 4276.716 = £223.284 = £223 5*s.* 8*d.*+ = disc.

(6)

$1 + its interest for 3*mo.* = $1,015;
$2880 ÷ 1,015 = $2837,438+.
$1 + its interest for 6*mo.* = $1,03;
$1920 ÷ 1,03 = $1864,077+.
$1 + its interest for 9*mo.* = $1,045;
$960 ÷ 1,045 = $918,660+.
$2837,438 + 1864,077 + 918,660 = $4620,175+.

(7)

$1 + its interest for 4*mo.* at 4 per cent. = $1,01$\frac{2}{3}$;
$360 ÷ 1,01$\frac{2}{3}$ = $354,098+.
$1 + its interest for 8*mo.* = 1.03\frac{1}{3}$;
$360 ÷ 1,03$\frac{1}{3}$ = $348,386+.
$354,098 + $348,386 = $702,484+.

(8)

£1 + its interest for 3*mo.* = £1.015;
£412.5 ÷ 1.015 = £406.4039+.
£1 + its interest for 6*mo.* = £1.03;
£275 ÷ 1.03 = £266.9902+.
£1 + its interest for 9*mo.* = £1.045;
£137.5 ÷ 1.045 = £131.5789+.
£406.4039 + 266.9902 + 131,5789 = £804.9730+.
= £804 19*s.* 5*d.*+.

(9)

The present value of £900 due in 6 months, at 6 per cent. interest
= £900 ÷ £1.03 = £873 15*s.* 8$\frac{1}{2}$*d.*+.
£873 15s. 8½d. + − £750 = £123 15s. 8½d.+ = gain.

(10)

$1 + its interest for 9*mo.* at $4\frac{1}{2}$ per cent. = $1,03375.

$4000 ÷ 1,03375 = $3869,407 +.

(11)

Represent the whole amount of corn by 1;

then, $1 - \frac{1}{16} = \frac{15}{16}$ = what remained after deducting toll;

and, $\frac{15}{16}$: 1 :: 1*bu.* : *Ans.*

Ans. $1bu.\ 2\frac{2}{15}qt.$

(12)

The note has 3*mo.* 16*da.* to run from September 25th to January 11th.

$1 + its interest for 3*mo.* 16*da.* = $1,017\frac{2}{3} = \frac{3.053}{3}$;

$2146,50 ÷ $\frac{3.053}{3}$ = $2109,236 +.

(13)

From August 24th, 1838, to October 27th, 1842, is 4*yr.* 2*mo.* 3*da.*

$1 + its interest for 4*yr.* 2*mo.* 3*da.* = $1,2505;

$3456 ÷ 1,2505 = $2763,694 +.

(14)

$1 + its interest for 4 years at 5 per cent. = $1,20;

$4800 ÷ 1,20 = $4000.

(15)

$1 + its interest for 9*mo.* at 7 per cent. = $1,0525;

$230 ÷ 1,0525 = $218,527 +.

$225 − $218,527 + = $6,473 + = *loss.*

INSURANCE.

(2)

$37500
.03½
112500
18750
Ans. $1312,50

(3)

$47520
.00½
Ans. $237,60

$47520
.00⅓
Ans. 158,40

(4)

$14000
.01½
14000
7000
Ans. $210,00

$14000
.00¾
Ans. $105,00

$14000
.00½
Ans. $70,00

$14000
.00⅓
Ans. $46,66+

$14000
.00¼
Ans. $35,00

(5)

$27000
.02¼
54000
6750
A. $607,50

$27000
.02
A. $540,00

$27000
.01½
27000
13500
A. $405,00

$27000
.00¾
A. $202,50

$27000
.00½
A. $135,00

$27000
.00¼
A. $67,50

$27000
.00⅕
A. $54,00

$27000
.00⅙
A. $45,00

(6)

$9870
.14
39480
9870
Ans. $1381,80

(7)

$28800
.01¾
28800
21600
Ans. $504,00

(8)

$750
.01¾
750
562½
Ans. $13,12½

(9)

$8750
.03½
26250
4375
Ans. $306,25

(10)

$24000
6000
18000
.02½
36000
9000
Ans. $450,00

(11)

$36000
12000
24000
.05½
120000
12000
Ans. $1320,00

EQUATION OF PAYMENTS.

(2)

$100 × 4 = 400
$200 × 10 = 2000
$300 × 16 = 4800
600 600)7200(12
600
1200
1200

(3)

$600 × 12 = 7200
$800 × 6 = 4800
$900 × 9 = 8100
2300 2300)20100(8*mo.* 22$\frac{4}{23}$*da.*
18400
1700
30
51000
4600
5000
4600
$\frac{400}{2300} = \frac{4}{23}$
Ans. 8mo. 22$\frac{4}{23}$*da.*

(4)

$200 × 6 = 1200
$150 × 8 = 1200
$250 × 12 = 3000
600 6|00)54|00
Ans. 9*mo.*

(5)

$300 × 60 = 18000
$500 × 120 = 60000
$750 × 180 = 135000
1550 1550)213000(137
1550
5800
4650
11500
10850
650/1550 = 13/31
Ans. 137 13/31 *da.*

(6)

$250 × 2 = 500
$500 × 3 = 1500
$750 × 6 = 4500
1500 15|00)65|00(4 1/3
60
5/15 = 1/3
Ans. 4 1/3 *mo.*

(7)

$1000 × 0 = 000000
$1500 × 31 = 46500
$3000 × 59 = 177000
$4000 × 104 = 416000
9500 95|00)6395|00(67 6/19
570
695
665
30
Ans. 67 6/19 *days.*

(8)

From July 1st to 1st payment 14 days.
" " " 2d payment 40 days.
" " " 3d payment 67 days.
" " " 4th payment 160 days.

$3750 × 14 = 52500
$3000 × 40 = 120000
$2400 × 67 = 160800
$2250 × 160 = 360000
11400 114|00)6933|00(60 93/114 *days.*
684
93

Ans. 60 93/114 days from July 1st, or Aug. 31st.

(9)

$1600 × 5 = 8000
1200 × 6 = 7200
1200 × 8 = 9600
4000 4|000)24|800

Ans. $6\frac{1}{5}mo. = 6mo.\ 6da.$

(10)

Estimate from December 1st.

From December 1st to 1st payment 5 days.
" " " 2d payment 38 days.
" " " 3d payment 62 days.

$650 × 5 = 3250
890 × 38 = 33820
7940 × 62 = 492280
948 948|0)52935|0($55\frac{795}{948}$
4740
5535
4740
795

Ans. $55\frac{795}{948}$ *days,* or Jan. 25th.

PARTNERSHIP OR FELLOWSHIP.

(2)

A . . $1800
B . . 300
$2100

$2100 : { $1800 / 300 } :: 1000 : { $857,14 + A's share. / $142,85 + B's share.

(3)

In the first place, £80 of the profits are set aside for A and D. The remainder £15920 is then divided into four equal parts, giving £3980 for the shares of B and C. Then, by adding £50 and £30, we find

A's share = £4030, and D's = £4010.

(4)

4)£10000 8)10000 6)10000
£2500 = A's. 1250 = B's. 1666,66+ = C's.

8)10000
1250 = D's.

$10,000 − 6666,66 = $3333,34 = E's share.

DOUBLE FELLOWSHIP.

(2)

A's stock £50 × 4 = 200
B's " 60 × 5 = 300
500

500 : {200 / 300} :: 24 : {£ 9 12s. A's share. / £14 8s. B's share.}

(3)

C's = 27 × 23 = 621
D's = 39 × 21 = 819
1440

1440 : {621 / 819} :: 54 : {£23 5s. 9d. = C's. / £30 14s. 3d. = D's.}

(4)

A's= 400×5= 2000
B's= 600×7= 4200
C's= 960×8= 7680
D's=1200×9=10800
24680

24680 : { 2000, 4200, 7680, 10800 } :: $750 : { $60,777+=A's., $127,633+=B's., $233,387+=C's., $328,000+=D's. }

CUSTOM HOUSE BUSINESS.

(1)

125
48
1000
500
6000
3
4)18000*oz.*
4)4500
1125*lb.*
2,50
56250
2250
Ans. $2812,50

(2)

Weight of each bag=160*lb.*
Deduct for draft - - - 2
158
225
35550 790
.02 316
711.00*lb.* tare. 316
35550*lb.*
Deduct tare 711
34839
.06
20 per *ct.*=$\frac{1}{5}$; 5)$2090,34
Ans. $418,068 *duty.*

(3)

275
2.75
1375
1925
550
756.25*gal.*
37.8125
718.4375
.35
35921875
21553125
Ans. $251,453125

756.25
.05
37.8125*gal.* tare.

(4)

196
Draft 2
194
175
970
1358
194
33950*lb.*
5092.5
28857.5
.05
Ans. $1442,875

33950*lb.*
.15
169750
33950
5092.50*lb.* tare.

(5)

2*cwt.* 2*qr.* 27*lb.*=277*lb.*

277
Draft 3
274
75
1370
1918
20550*lb.*
2260.5
18289.5
.01⅞
182.895
160.033+
5)342.928
Ans. $68,585+

ALLIGATION MEDIAL.

(2)

15 gallons at \$1 per *gal.* - - - \$15,00
25 gallons at \$0,75 per *gal.* - 18,75
40 4|0)33,7|5
Ans. \$0,84+

(3)

40 gallons at 31*cts.* per *gal.* - - - - \$12,40
3 gallons of water at 0 per *gal.* - 0,00
43 43)12,40(28$\frac{36}{43}$*cts.*
86
380
344
36
Ans. 28$\frac{36}{43}$*cts.*

(4)

2*lb.*=24*oz.* of 22 carats fine - - - 528
6*oz.* of 20 " " - - - 120
6*oz.* of 16 " " - - - 96
36 36)744(20$\frac{24}{36}$ *Ans.*
72
$\frac{24}{36}=\frac{2}{3}$
Ans. 20$\frac{2}{3}$ *carats.*

(5)

6 to 9=3*hr.* at 64° - - - - - 192
9 to 12=3*hr.* at 74° - - - - - 222
12 to 3=3*hr.* at 84° - - - - - 252
3 to 6=3*hr.* at 70° - - - - - 210
12 12)876
Ans. 73°

ALLIGATION ALTERNATE.

CASE I.

(2)

24 { 16 - - - - - 4 at 16 cents.
20 - - - - - 4 at 20 cents.
28 - - - - - 8+4=12 at 28 cents.

(3)

21 { 16 - 3 of 16
18 - 2 of 18
23 - 3 of 23
24 - 5 of 24

(4)

18 { 10 - 6 of 10*s.*
14 - 3 of 14*s.*
21 - 4 of 21*s.*
24 - 8 of 24*s.*

CASE II.

(2)

64 { $0, 36 - 56
$0, 48 - 8
$0, 72 - 16
$1, 20 - 28 } Proportional parts.
- Simple whose quantity is given.

28 : 14 :: 56 : 28*bu.* of oats.
28 : 14 :: 8 : 4*bu.* of barley.
28 : 14 :: 16 : 8*bu.* of rye.
28 : 14 :: 28 : 14*bu.* of wheat.

(3)

3*s.* 6*d.*=42*d.* { 2*s.*=24*d.* 18*d.* 6 Simple whose quantity is given.
3*s.*=36*d.* 6
4*s.*=48*d.* 6 } Propor. parts.
24+18+6=48

6 : 12 :: 6 : 12*bu.* of oats.
6 : 12 :: 6 : 12*bu.* of barley.
6 : 12 :: 6 : 12*bu.* of rye.
6 : 12 :: 48 : 96bu. of wheat.

(4)

8 { 4*s.* — 4 ; 7*s.*] 4 ; 12*s.* — 4+1=5 } Proportional parts. Simple whose quantity is given.

5 : 40 :: 4 : 32*gal.* of spirits.
5 : 40 :: 4 : 32*gal.* of English.
5 : 40 :: 5 : 40*gal.* of French.

CASE III.

(2)

7 { 5*s.* — 2 ; 6*s.*] 1 ; 8*s.*] 1 ; 9*s.* — 2 }

6 : 87 :: 2 : 29*lb.*
6 : 87 :: 1 : 14½*lb.*
6 : 87 :: 1 : 14½*lb.*
6 : 87 :: 2 : 29*lb.*

Sum of proportional parts 6

(3)

5 { 4 — 5+3+1=9 ; 6] 1 ; 8] 1 ; 10 — 1 }

12 : 60 :: 9 : 45*gal.*
12 : 60 :: 1 : 5*gal.*
12 : 60 :: 1 : 5*gal.*
12 : 60 :: 1 : 5*gal.*

Sum of proportional parts 12

(4)

17 { 15 — 7+5+3=15 ; 20] 2 ; 22] 2 ; 24 — 2 }

21 : 42 :: 15 : 30
21 : 42 :: 2 : 4
21 : 42 :: 2 : 4
21 : 42 :: 2 : 4

Sum of proportional parts 21

DUODECIMALS.

(1)

12)185′

Ans. 15*ft.* 5′

(2)

12)250″

12)20′ . . . 10″

Ans. 1*ft.* 8′ 10″

(3)

12)436‴

12)363″ . . . 11‴

12)30′ . . . 3″

2 . . . 6′

Ans. 2*ft.* 6′ 3″ 11‴

EXAMPLES IN ADDITION AND SUBTRACTION.

(1)

	3*ft.*	6′	3″	2‴
	2*ft.*	1′	10″	11‴
Ans.	5*ft.*	8′	2″	1‴

(2)

	8*ft.*	9′	7″	
	6*ft.*	7′	3″	4‴
Ans.	15*ft.*	4′	10″	4″

(3)

	9*ft.*	3′	5″	6‴
	7*ft.*	3′	6″	7‴
Ans.	1*ft.*	11′	10″	11‴

(4)

	40*ft.*	6′	6″	
	29*ft.*	0′	0″	7‴
Ans.	11*ft.*	6′	5″	5″

MULTIPLICATION OF DUODECIMALS.

(3)

	ft.		
	25	6′	length.
	2	7′	breadth.
	51	0′	
	14	10′	6″
	65	10′	6″
	3	3′	thickness.
	197	7′	6″
	16	5′	7″ 6‴
Ans.	214	1′	1″ 6‴

(4)

	ft.		
	9	2′	
	9	6′	
	82	6′	
	4	7′	
Ans.	87	1′	

(5)

	ft.		
	24	10′	
	6	8′	
	149	0′	
	16	6′	8″
Ans.	165	6′	8″

(6)

	ft.		
	70	9′	
	12	3′	
	849	0′	
	17	8′	3″
Ans.	866	8′	3″

(7)

	ft.	
24	96	
4	3	6′
96	288	
	48	

128)336(2 *cords.*
256
16)80(5 *C. feet.*
80

Ans. 2 *cords* and 5 *cord feet.*

INVOLUTION.

(1)

125
125
625
250
125
15625
125
78125
31250
15625
Ans. 1953125

(2)

7
7
49
7
Ans. 343

(3)

60
60
Ans. 3600

(4)

5
5
25
5
125
5
Ans. 625

(5)

9
9
81
9
729
9
6561
9
Ans. 59049

(6)

1
1
1
1
Ans. 1

EVOLUTION.

EXTRACTION OF THE SQUARE ROOT.

CASE I.

(3)

10 69 29(327
9
62)169
124
647)4529
4529

(4)

2 26 87 41(1506.23+
1
25)126
125
3006)18741
18036
30122)70500
60244
301243)1025600
903729
121871

(5)

7 59 67 96(2756.22+
4
47)359
329
545)3067
2725
5506)34296
33036
55122)126000
110244
551242)1575600
1102484
473116

(6)

36 37 29 61(6031
36
1203)3729
3609
12061)12061
12061

(7)

22 07 12 04(4698
16
86)607
516
929)9112
8361
9388)75104
75104

CASE II.

(2)

32 71. 42 07(57.19+
25
107)771
749
1141)2242
1141
11429)110107
102861
7246

(3)

47 95. 25 73 10(69.247+
36
129)1195
1161
1382)3425
2764
13844)66173
55376
138487)1079710
969409
110301

(4)

4. 37 25 94(2.091+
4
409)3725
3681
4181)4494
4181
313

(5)

.00 03 27 54(.01809+
01
28)227
224
3609)35400
32481
2919

(6)

.00 10 30 41(.0321
9
62)130
124
641)641
641

(7)

4. 42 68 16(2.104
4
41)42
41
4204)16816
16816

CASE III.

(1)

23 04(48
16
88)704
704

$\frac{48}{72}=\frac{2}{3}$.

51 84(72
49
142)284
284

(2)

27 04(52
25
102)204
204

13)$\frac{52}{65}=\frac{4}{5}$.

42 25(65
36
125)625
625

(3)

92 16(96
81
186)1116
1116

$\frac{96}{112}=\frac{6}{7}$.

1 25 44(112
1
21)25
21
222)444
444

(4)

341)275.0000000000(.8064516129+
2728
2200
2046
1540
1364
1760
1705
550
341
2090
2046
440
341
990
682
3080
3069
11

.80 64 51 61 29(.89802+
64
169)1664
1521
1788)14351
14304
179602)476129
359204
116925

(5)

```
476)57.0(.75          .75 00 00 00 00(.86602
   3332                  64
   2380               166)1100
   2380                   996
                     1726)10400
                         10356
                    173202)440000
                           346404
                            93596
```

(6)

```
549)478.0(.8706739526+
    4392
     3880
     3843
       3700              .87 06 73 95 26(.93309
       3294               81
        4060            183)606
        3843               549
         2170           1863)5773
         1647              5589
          5230       186609)1849526
          4941             1679481
           2890             170045
           2745
            1450
            1098
             3520
             3294
              226
```

EXTRACTION OF THE CUBE ROOT.

CASE I.

(2)

$$\begin{array}{rl} & 389\,017(73 \\ 7^3= & 343 \\ \hline 7^2\times 3=147) & 46\,0 \\ & \\ & 389\,017 \\ \overline{73}^3= & 389\,017 \end{array}$$

(3)

$$\begin{array}{rl} & 5\,735\,339(179 \\ 1^3= & 1 \\ \hline 1^2\times 3= 3) & 4\,7 \\ & \\ & 5\,735 \\ \overline{17}^3= & 4\,913 \\ \hline \overline{17}^2\times 3=867) & 822\,3 \\ & \\ & 5\,735\,339 \\ \overline{179}^3= & 5\,735\,339 \end{array}$$

(4)

$$\begin{array}{rl} & 32\,461\,759(319 \\ & 27 \\ \hline 3^2\times 3= & 27)5\,4 \\ & \\ & 32\,461 \\ \overline{31}^3= & 29\,791 \\ \hline \overline{31}^2\times 3=2883) & 2\,670\,7 \\ & \\ & 32\,461\,759 \\ \overline{319}^3= & 32\,461\,759 \end{array}$$

(5)

$$\begin{array}{rl} & 84\,604\,519(439 \\ & 64 \\ \hline 4^2\times 3= & 48)20\,6 \\ & \\ & 84\,604 \\ \overline{43}^3= & 79\,507. \\ \hline \overline{43}^2\times 3=5547) & 5\,097\,5 \\ & \\ & 84\,604\,519 \\ \overline{439}^3= & 84\,604\,519 \end{array}$$

(6)

$$\begin{array}{rl} & 259\,694\,072(638 \\ & 216 \\ \hline 6^2\times 3= & 108)43\,6 \\ & \\ & 259\,694 \\ \overline{63}^3= & 250\,047 \\ \hline \overline{63}^2\times 3=11907) & 9\,647\,0 \\ & \\ & 259\,694\,072 \\ \overline{638}^3= & 259\,694\,072 \end{array}$$

(7)

$$\begin{array}{rl} & 48\,228\,544(364 \\ & 27 \\ \hline 3^2\times 3= & 27)212 \\ & \\ & 48\,228 \\ \overline{36}^3= & 46\,656 \\ \hline \overline{36}^2\times 3=3888) & 1\,572\,5 \\ & \\ & 48\,228\,544 \\ \overline{364}^3= & 48\,228\,544 \end{array}$$

(8)

$$\begin{array}{rl}
 & 27\dot{}\,054\dot{}\,036\dot{}\,008\dot{}(3002 \\
 & 27 \\
3^2\times 3= & \overline{27})0 \\
\overline{30}^2\times 3= & \overline{2700})54\,0 \\
\overline{300}^2\times 3= & \overline{270000})54\,036\,0 \\
 & 27\dot{}\,054\dot{}\,036\dot{}\,008\dot{} \\
\overline{3002}^3= & \underline{27\,054\,036\,008}
\end{array}$$

CASE II.

(1)

$$\begin{array}{rl}
 & .157\dot{}\,464\dot{}(.54 \\
 & 125 \\
5^2\times 3= & \overline{75})32\,4 \\
 & .157\dot{}\,464\dot{} \\
\overline{54}^3= & \underline{.157\,464}
\end{array}$$

(2)

$$\begin{array}{rl}
 & .870\dot{}\,983\dot{}\,875\dot{}(.955 \\
 & 729 \\
9^2\times 3= & \overline{243})141\,9 \\
 & .870\dot{}\,983\dot{} \\
\overline{95}^3= & \underline{.857\,375} \\
\overline{95}^2\times 3= & \overline{27075})13\,608\,8 \\
 & .870\dot{}\,983\dot{}\,875\dot{} \\
\overline{955}^3= & \underline{.870\,983\,875}
\end{array}$$

(3)

$$\begin{array}{rl}
 & 1\dot{2}.\,977\dot{}\,875\dot{}(2.35 \\
 & 8 \\
2^2\times 3= & \overline{12})4\,9 \\
 & 1\dot{2}.\,977\dot{} \\
\overline{2.3}^3= & \underline{12.\,167} \\
\overline{2.3}^2\times 3= & \overline{1587})810\,8 \\
 & 1\dot{2}.\,977\,875\dot{} \\
\overline{2.35}^3= & \underline{12.\,977\,875}
\end{array}$$

(4)

$$\begin{array}{rl}
 & .75\dot{1}\,089\dot{}\,429\dot{}(0.909 \\
 & 729 \\
9^2\times 3= & \overline{243})22\,0 \\
 & .75\dot{1}\,089\dot{} \\
\overline{90}^3= & \underline{.729\,000} \\
\overline{90}^2\times 3= & \overline{24300})22\,089\,4 \\
 & .75\dot{1}\,089\,429\dot{} \\
\overline{0.909}^3= & \underline{.751\,089\,429}
\end{array}$$

(5)

$$\begin{array}{rl}
 & .35\dot{3}\ 39\dot{3}\ 24\dot{3} \\
 & 343 \\
\hline
7^2\times 3= & 147)10\ 3 \\
\hline
70^2\times 3= & 14700)10\ 39\dot{3}\ 2 \\
 & 35\dot{3}\ 39\dot{3}\ 24\dot{3} \\
\hline
\overline{0.707}^3= & 353\ 393\ 243
\end{array}$$

(6)

$$\begin{array}{rl}
 & \dot{3}.\ 40\dot{8}\ 86\dot{2}\ 62\dot{5}(1.505 \\
 & 1 \\
\hline
1^2\times 3= & 3)2\ 4 \\
 & \dot{3}.\ 40\dot{8} \\
\hline
\overline{1.5}^3= & 3.\ 375 \\
\hline
1.5^2\times 3= & 6.75)33\ 8 \\
\hline
1.50^2\times 3= & 6.7500)33\ 862\ 6 \\
 & \dot{3}.\ 40\dot{8}\ 86\dot{2}\ 62\dot{5} \\
\hline
\overline{4505}^3= & 3.\ 408\ 862\ 625
\end{array}$$

(7)

$$\begin{array}{rl}
 & 2\dot{7}.\ 70\dot{8}\ 10\dot{1}\ 57\dot{6}(3.026 \\
 & 27 \\
\hline
3^2\times 3= & 27)\ 7 \\
\hline
30^2\times 3= & 2700).708\ 1 \\
 & 2\dot{7}\ 70\dot{8}\ 10\dot{1} \\
\hline
\overline{302}^3= & 27\ 543\ 608 \\
\hline
302^2\times 3= & 27.3612)164\ 493\ 5 \\
 & 2\dot{7}.\ 70\dot{8}\ 10\dot{1}\ 57\dot{6} \\
\hline
\overline{3.026}^3= & 27.\ 708\ 101\ 576
\end{array}$$

CASE III.

(1)

$\frac{2)250}{2)686} = \frac{125}{343}$

125(5 — 125

Ans. $\frac{5}{7}$. 343(7 — 345

(2)

$22\frac{19}{27} = \frac{343}{27}$

343(7 — 343

Ans. $\frac{7}{3} = 2\frac{1}{3}$. 27(3 — 27

(3)

$31\frac{15}{343} = \frac{10648}{343}$

10 648(22 — 8

$2^2 \times 3 = 12)26$

$\overline{22}^3 =$ 10 648

343(7 — 343

Ans. $\frac{22}{7} = 3\frac{1}{7}$.

(4)

$\frac{12)324}{12)1500} = \frac{27}{125}$

27(3 — 27

125(5 — 125

Ans. $\frac{3}{5}$.

(5)

7)4.000000000

.571428571 +

.571 428 571(.829+ — .512

$8^2 \times 3 =$ 192)59 4

$\overline{82}^3 =$.571 428 — .551 368

$\overline{82}^2 \times 3 = 20172)20\ 060\ 5$

$\overline{829}^3 =$.571 428 571 — .569 722 789

1 705 782

(6)

$$9)5.000000000$$
$$.555555555+$$

$$.55\dot{5}\ 55\dot{5}\ 55\dot{5}(.822+$$
$$.512$$
$$8^2\times 3=\ 192)\ 43\ 5$$
$$.55\dot{5}\ 55\dot{5}$$
$$.\overline{82}^2=\ .551\ 368$$
$$\overline{82}^2\times 3=20172)\ 4\ 187\cdot 5$$
$$.55\dot{5}\ 55\dot{5}\ 55\dot{5}$$
$$\overline{822}^3=\ .555\ 412\ 248$$
$$143\ 307$$

(7)

$$3)2.000000000$$
$$.666666666+$$

$$.66\dot{6}\ 66\dot{6}\ 66\dot{6}(.873+$$
$$.512$$
$$8^2\times 3=192).154\ 6$$
$$.66\dot{6}\ 66\dot{6}$$
$$.\overline{87}^2=\ .658\ 503$$
$$\overline{87}^2\times 3=22707)\ 8\ 163\ 6$$
$$.66\dot{6}\ 66\dot{6}\ 66\dot{6}$$
$$\overline{873}^3=\ .665\ 338\ 617$$
$$1\ 328\ 049$$

ARITHMETICAL PROGRESSION.

CASE I.

(2)

49 number of terms less 1
3 common difference
147
6*cts.* 1st term
$1,53 last term.

(3)

15 number of terms less 1
7 common difference
105
100 1st term
205 last term.

CASE II.

(3)

Greatest extreme 58
Least " 3
Number of terms less 1 . . 11)55(5 common differe

CASE III.

(2)

1 1st term
12 last term
13 sum of extremes
6 half number of terms.
78 *Ans.*

(3)

8 number of terms less 1
4 common difference
32
2
34 last term
2
36 sum of extremes
$4\frac{1}{2}$
144
18
162 sum of the series.

(4)

To get the first egg 2 yards, 1st term
To get the last 200 yards, last term
Sum of the extremes . . . 202
Half the number of terms . 50
No. of yards in a mile 1760)10100(5 miles 1300 yards.
8800
1300

GEOMETRICAL PROGRESSION.

CASE I.

(2)

$2^{11}=2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2=$
2048*far.*
1 1st term
2048*far.*

which are equal to £2 2s. 8d.

(3)	(4)
$2^9 = 512$	$2^{11} = 2048$
First term 50	3 1st term
Eldest child's part £25600	*Ans.* $61,44

CASE II.

(2)	(3)
$2^{11} = 2048$	$3^9 = 19683$
First term . . 1	1 1st term
last term . . . 2048	$196,83 last term
minus 1st term 1	1 1st term
2−1=1)2047	3−1=2)196,82
greatest extreme 2048	98,41
20)4095 sum	196,83 last term
Ans. £204..15*s.*	*Ans.* $295,24

(4)

$2^5 = 32$; and $32 \times 150 = \$4800$ eldest child's portion

150

2−1=1)4650

4650

4800

Ans. $9450

MENSURATION.

TRIANGLE.

(2)

Base 40*ch.*

Perpendicular 15*ch.*

2)600

10)300 *Sq. ch.*

Ans. 30 A.

(3)

Base 35 *rods.*
Perpendicular . 26 *rods.*

210
70
2)910
455 *Sq. rods.*
Equal to . . . 2*A.* 3*R.* 15*P.*

SQUARE, RECTANGLE, ETC.

(1)

33.08 × 33.08 = 1094.2864 *Sq. ch.*

10)1094.2864 *Sq. ch.*
109.42864
4
1.71456
40
28.58240

Ans. 109*A.* 1*R.* 28*P.*+.

(2)

27 × 27 = 729 *Sq. ch.*

10)729
72.9
4
3.6
40
24.0

Ans. 72*A.* 3*R.* 24*P.*

(3)

25 × 25 = 625 *Sq. rods.*

4|0)62|5
4)15 . . 25
3 . . 3

Ans. 3*A.* 3*R.* 25*P.*

(4)

40 × 20 = 800 *Sq. rods.*
Equal to 5*A.*

(5)

$40 \times 40 = 1600$ *Sq. rods.* $= 10A.$

(6)

$15 \times 5 = 75$ *Sq. ch.* $= 7A.\ 2R.$

(7)

$27ch. = 108$ *rods*; $108 \times 9 = 972P.$
equal to $6A.\ 0R.\ 12P.$

(8)

$360ft. = 120yd.$; $120 \times 271 = 32520$ *Sq. yd.*

TRAPEZOID.

(2)

$12.41 + 8.22 = 20.63$;
$20.63 \times 5.15 = 106.2445$ *Sq. ch.*
$\frac{106.2445}{2} = 53.12225 = 5A.\ 1R.\ 9.956P.$ = the area.

(3)

$25ft.\ 6' + 18ft.\ 9' = 44ft.\ 3'$;
$44ft.\ 3' \times 10ft.\ 5' = 460ft.\ 11'\ 3''$.
$\frac{460ft.\ 11'\ 3''}{2} = 230ft.\ 5'\ 7''+$ = the area.

(4)

$20.5 + 12.25 = 32.75$;
$32.75 \times 10.75 = 352.0625$ *Sq. yd.*
$\frac{352.0625}{2} = 176.03025$ *Sq. yd.* = area.

(5)

$7.50+12.25=19.75$;

$19.75\times 15.4=304.15$ *Sq. ch.*

$\frac{304.15}{2}=152.075=15A.\ 0R.\ 33P.=$area.

(6)

$20+32=52$;

$52\times 26=1352$ *Sq. ch.*

$\frac{1352}{2}=676=67A.\ 2R.\ 16P.=$area.

CIRCUMFERENCE OF THE CIRCLE.

(2)

3.1416
93
94248
282744
Ans. 292.1688

(3)

3.1416
20
Ans. 62.8320

DIAMETER OF THE CIRCLE.

(2)

3.1416)11652.1944(3709
94248
222739
219912
282744
282744
Ans. 3709

(3)

3.1416)6850.0(2180.41+
62832
56680
31416
252640
251328
131200
125664
55360
31416
Ans. 2180.41+. 23944

AREA OF THE CIRCLE.

(2)

$\overline{10}^2 =$.7854
100
Ans. 78.5400

(3)

$7^2 =$.7854
49
70686
31416
Ans. 38.4846

(4)

$3\frac{1}{2} = \overline{3.5}^2 = 12.25$ *Sq. ft.*
.7854
4900
6125
9800
8575
9)9.621150
Ans. 1.069016+

SURFACE OF THE SPHERE.

(2)

3.1416
$7^2 =$ 49
282744
125664
Ans. 153.9384

(3)

3.1416
$\overline{24}^2 =$ 576
188496
219912
157080
Ans. 1809.5616

(4)

7918.7
7918.7
554309
633496
79187
712683
554309
62705809.69
3.1416
37623485814
6270580969
25082323876
6270580969
18811742907
Ans. 196996571.722104

SOLIDITY OF THE SPHERE.

(2)

3.1416
4^2= 16
188496
31416
Surface 50.2656
4
6)201.0624
Ans. 33.5104

(3)

3.1416
14^2= 196
188496
282744
31416
Surface 615.7536
14
24630144
6157536
6)8620.5504
Ans. 1436.7584 *S. in.*

(4)

Surface - - - 196996571.72
Diameter - - . 7918.7
137897600204
157597257376
19699657172
177296914548
137897600204
6)1559956752479164
Ans. 259992792079.860+

(5)

3.1416
6^2= 36
188496
94248
Ans. 113.0976 *S. ft.*

CONVEX SURFACE OF THE PRISM.

(1)

ft.
35
5
175
26
1050
350
Ans. 4550 *Sq. ft.*

(2)

ft.
15
8
120
12
Ans. 1440 *Sq. ft.*

SOLID CONTENT OF THE PRISM.

(2)

$\overline{24}^3 = 576$
height 24
2304
1152
Ans. 13824 *S. in.*

(3)

3*ft.*	2′		8*ft.*	5′	4″
2	8′		2	6′	
6	4′		16	10′	8″
2	1′	4″	4	2′	8″
8	5′	4″	21	1′	4″

$\frac{1}{12}$ *S. ft.* + $\frac{4}{12}$ of $\frac{1}{12}$ *S. ft.* or $\frac{4}{144}$ *S. ft.*
is equal $\frac{1}{12} + \frac{4}{144} = \frac{16}{144} = \frac{1}{9}$ *S. ft.*
Ans. $21\frac{1}{9}$ *S. ft.*

(4)

$21\frac{1}{9}$ *S. ft.* $= 21\frac{1}{9} \times 1728 = 36480$ *S. in.*
Solid inches in a gallon - - 231)36480(157
231
1338
1155
1830
1617
213
Ans. $157\frac{213}{231}$ *gal.*

(5)

Base - - - - - - - 350
Altitude - - - - - 10
Solidity - - - - - 3500 *S. ft.*

CONVEX SURFACE OF THE CYLINDER.

(2)

ft.
14
$8\frac{1}{3}$
112
$4\frac{2}{3}$
Ans. $116\frac{2}{3}$ *Sq. ft.*

(3)

3.1416
30
94.2480
5*ft.* = 60*in.*
5654.8800 *Sq. in.*

(4)

3.1416
20
62.8320
50
Ans. 3141.6000 *Sq. ft.*

SOLIDITY OF THE CYLINDER.

(2)

.7854
$\overline{20}^2$ = 400
Area of base - 314.1600
Altitude - - - 29
282744
62832
Ans. 9110.6400

(3)

.7854
$\overline{12}^2$ = 144
31416
31416
7854
113.0976
Altitude - - 30
Ans. 3392.9280

(4)

.7854
$\overline{16}^2$ = 256
47124
39270
15708
201.0624
Altitude - 9
Ans. 1809.5616

(5)

.7854
$\overline{50}^2$ = 2500
39270
15708
1963.5000
15
98175
19635
Ans. 29452.5

SOLIDITY OF THE PYRAMID.

Instead of multiplying the base by the altitude and dividing the product by 3, we may, if we please, multiply the base by one-third of the altitude.

(2)

Base - - - - - - - - -	260
one-third altitude - -	8
Solidity - - - - - -	2080

(3)

Base - - - - - - - - -	207
one-third altitude - -	6
Solidity - - - - - -	1242

(4)

Base - - - - - - - - -	403
one-third altitude - -	10
Solidity - - - - - -	4030

(5)

Base - - - - - - - - -	270
one-third altitude - -	$5\frac{1}{3}$
Solidity - - - - - -	1350
	90
Ans.	1440

(6)

$25 \times 12 = 300$ area base	
one-third alti.	12
Solidity - -	3600

(7)

$30 \times 30 = 900$ area base	
	20
	3)18000
Solidity - -	6000

SOLIDITY OF THE CONE.

(2)

	.7854
$\overline{18}^2 =$	324
	31416
	15708
	23562
Area base	254.4696
Altitude	27
	17812872
	5089392
	3)6870.6792
Ans.	2290.2264

(3)

	.7854
$\overline{20}^2 =$	400
Area of base - -	314.1600
Altitude - - - -	30
	3)9424.8000
Ans.	3141.6

(4)

$$\begin{array}{rr} & .7854 \\ \overline{10}^2 = & 100 \\ \text{Area of base} & 78.5400 \\ \text{Altitude} & 27 \\ & 54978 \\ & 15708 \\ 3) & 2120.58 \\ \textit{Ans.} & 706.86 \end{array}$$

(5)

$$\begin{array}{rr} & .7854 \\ \overline{15}^2 = & 225 \\ & 39270 \\ & 15708 \\ & 15708 \\ \text{Area of base} & 176.7150 \\ \text{Altitude} & 12 \\ 3) & 2120.5800 \\ \textit{Ans.} & 706.86 \end{array}$$

GAUGING.

(2)

$38-32=6$

$\frac{2}{3}$ of $6=4$

$32+4=36$ mean diameter.

$36^2=1296$

$1296\times 42\times 34=185.0688$*gal.*

(3)

$35-30=5$

$\frac{2}{3}$ of $5=\frac{10}{3}$

$30+\frac{10}{3}=\frac{100}{3}$ mean diameter.

$(\frac{100}{3})^2=\frac{10000}{9}$

$\frac{10000}{9}\times 36\times 34=136$gal.

(4)

In 1 minute the pipe brings in - - - $\frac{14}{9}$*gal.*
The tap discharges in 1 minute - - $\frac{40}{31}$*gal.*
Hence, it fills in 1 minute $\frac{14}{9}-\frac{40}{31}=\frac{74}{279}$*gal.*

It so runs for 3*hr.*=180 minutes: hence, it fills in that time $\frac{74}{279}\times 180=\frac{1480}{31}$*gal.*

It has then to fill $147-\frac{1480}{31}=\frac{3077}{31}$*gal.*

gal. *gal.* *m.*
14 : $\frac{3077}{31}$:: 9 : *Ans.*;

434)27693(63*m.*
2604
1653
1302
351

$\frac{3077}{31}\times\frac{9}{14}=\frac{27693}{434}$*m.*

351
60
434)21060(48*sec.*
1736
3700
3472
228

$\frac{228}{434}=\frac{114}{217}$.

that is, after 5 o'clock it fills in 63*m.* $48\frac{114}{217}$*sec.*; that is, at 6 o'clock 3*m.* $48\frac{114}{217}$*sec.*

(5)

$38-34=4$

$\frac{2}{3}$ of $4=\frac{8}{3}$

$34+\frac{8}{3}=\frac{110}{3}$ mean diameter.

$(\frac{110}{3})^2=\frac{12100}{9}$

$\frac{12100}{9}\times 40\times 34=182.844$*gal.*+.

PROMISCUOUS QUESTIONS.

(1)

Thirty-nine packages are three times as many as 13, and consequently will cost three times as much: hence,

$326\times 3=\$978$ Ans.

(2)

A £320 × 5 = 1600
B £460 × 3 = 1380
2980

2980 : 1600 :: 100 : £53 13*s.* $9\frac{135}{149}$*d.*
2980 : 1380 :: 100 : £46 6*s.* $2\frac{14}{149}$*d.*

(3)

1000*E. Fl.* = 1000 × 3 = 3000 quarter yards = 600*E. E.*
3000*qr. yd.* = 600*E. E.* cost - - - £90
Profit - - - - - - - - - £10
To bring - - - - - - - - £100 ÷ 600 = 3*s.* 4*d.*

(4)

$\frac{5}{6}$ tun = $\frac{5}{6}$ of 4 of 63*gal.* = 140*gal.*
140 contains $\frac{5}{6}$, 168 times; hence,
168 × £$\frac{5}{8}$ = *Ans.* = £105.

(5)

da.	*da.*	£	
365	232	48	*Ans.*

48
1856
928

365)11136(30 10 $2\frac{1}{4}$*d.*+
1095
186
20
365)3720
365
70
12
840
730
110
4
440

Ans. £30 10*s.* $2\frac{1}{4}$*d.*+

(6)

	£	*s.*	*d.*
365 × £1 - - -	365	0	
365 × 7*s.* - - -	127	15	
365 × 10*d.* - -	15	4	2
365 × $\frac{1}{2}$*d.* - - -		15	$2\frac{1}{2}$
Saved - - - -	340		
Income - - - -	848	14	$4\frac{1}{2}$

(7)

Each cannon expends $\frac{48}{8}$ = 6*bar.* per day. Hence, 24 cannons will expend in 1 day 24 × 6 = 144 barrels, and in 22 days, they will expend 144 × 22 = 3168 barrels.

(8)

Ans. The quotient of $\frac{1}{4} \div \frac{2}{3} = \frac{1}{4} \times \frac{3}{2} = \frac{3}{8}$.

(9)

Widow's portion - - - -	$1780
Son's 1250×4 - - - -	$5000
Amount	$6780
Cleared $126 \times 25\frac{1}{2} =$ - -	3213
Ans.	$3567

(10)

The remaining provisions would have lasted 360 men 1 month. But they last those who remained 5 months: hence, $\frac{1}{5}$ remained, or $\frac{4}{5}$ departed. Hence,

$\frac{4}{5}$ of $360 = Ans.$ 288.

(11)

A owes - - - - - -	$2173
Difference - - - -	371
B's - - - - - - - -	$2544

(12)

$58 - 3 = 55$: $11)55(5$ (ART. 272.)

(13)

1st night - -	8*ft.* up.
	4
2d morning -	4*ft.* up.
	8
2d night - - -	12*ft.* up.
	4
3d morning -	8*ft.* up.
	8
3d night - - -	16*ft.* up.
	4
4th morning -	12*ft.* up.
	8
4th night - -	20*ft.* at the top.

(14)

2 times 44= - -	88
twice 4+40= - -	48
1st *Ans.*	40
2 times 55= - -	110
twice 5+50= - -	60
2d *Ans.*	50

(15)

Her age at birth of first child - - - 19*yr.*
From birth of first child to last - - 24
Add - - - - - - - - - - - - - - - 19
Age - - - - - - 62*yr.*

(16)

43)4429(103
43
129
129
240
103
Ans. 137

(17)

Age on going to sea	17*yr.*
After - - - - - - -	8
Son's age - - - - -	46
Father still lived -	40
Father's age - - -	111*yr.*

(18)

Since the two sides multiplied together will give the number of men, the number divided by one side will give the other side.

32)384(12

(19)

$18 \times 30 = 540\ Sq.\ ft. = 60\ Sq.\ yd.$
breadth $\frac{3}{4}$) $60 = 60 \times \frac{4}{3} = 80 yd.$

(20)

A	$140	600	:	140	::	120	:	$28 A's.
B	$300	600	:	300	::	120	:	$60 B's.
C	$160	600	:	160	::	120	:	$32 C's.
	$600							

(21)

$33\frac{1}{2} \times 60\frac{1}{2} = 2026\frac{3}{4} = \frac{8107}{4}\ Sq.\ yd.$
$15in. = 1\frac{1}{4} ft.$: $15 \times 1\frac{1}{4} = 18\frac{3}{4} = \frac{75}{4}$
$\frac{75}{4}) \frac{8107}{4} = \frac{8107}{4} \times \frac{4}{75} = 108\frac{7}{75}.$

(22)

$\frac{3}{4}$ of $\frac{3}{5} = \frac{9}{20}$.

If he sold $\frac{9}{20}$ for $1710, what was the whole worth?

$\frac{9}{20}$: 1 :: $1710 : $3800.

(23)

They separate at the rate of 18 miles per day; at the end of 12 days they will be apart $18 \times 12 = 216$ miles.

(24)

$365da.\ 6hr. = 8766hr. = 31557600sec.$

Distance in miles - - - - - 95.000.000
Feet in 1 mile - - - - - - 5280
Distance in feet - - - - - 501.600.000.000

2000 : distance : : 1*sec.* : *Ans.*

$2|000)501.600.000|.000$
$250.800.000sec.$

$315576|00)250.800.0|00(7\frac{12457}{131149}$
220 903 2
24)29 896 8
24)31 557 6 $= \frac{12457}{131149}$

Ans. $7\frac{12457}{131149}$

(25)

$1mi. = 5280ft. = 63360in.$
$28 \times 70 = 1960in.$ per minute.
117600*in.* per hour.

$63360)\overline{117600}(1\frac{113}{132}mi.$
63360
$48)\overline{5424|0}$
$48)\overline{6336|0} = \frac{113}{132}$

(26)

$12 \times 11 = 132$ days' work, built 220 yards, and 480 yards remain.

220 : 480 : : 132 : 288*da.*

But it is to be built in 18 days: hence,

18)288(16 *men.*
18
108
108

that is, it requires 16 men, or 4 must be added.

(27)

12)500.000.000
3)41.666.666 . . 8*in.*
1760)13.888.888 2*ft.*(7891
12320
15688
14080
16088
15840
2488
1760
728

Ans. 7891*mi.* 728*yd.* 2*ft.* 8*in.*

(28)

Income - - - - - - - - - £1500
21 × 20=420*s.* and 52 × 420=21840*s.* - £1092
He saves - - - - - - - - £408

(29)

160 at 2 a penny - - - - 80*d.*
180 at 3 a penny - - - - 60*d.*
340 140*d.*

5 : 340 :: 2 : what they brought.
2
5)680
136

140 cost.
136 brought.
4 *loss.*

(30)

£500 13*s.* 6*d.* = £500.675

rate per *ct.* - - .03½

15.02025
2.503375

£17.523625
20

10.472500
12

5.670000
4

Ans. £17 10*s.* 5½*d.* + 2.680000

(31)

7 × 20 = 140*oz.* used by 1 man in a week.

140 × 12 × 1500 = 2520000 total ounces used.

7 × 8 = 56 what 1 man would use in 1 week by the 2d allowance: 56 × 20 = 1120 what he would use in 20 weeks.

112|0)252000|0(2250 *men.*
224
280
224
560
560

Ans. 2250 *men.*

(32)

⅞ : 1 : : $8400 : $10800 elder brother's part.

Younger brother's part 8400

Father's estate - - - - $19200

(33)

Three times as much in the same time will require 20 × 3 = 60 men; and in ⅓ of the time 60 ×

(34)

$\frac{2}{5}$ of $\frac{4}{9}$ of $\frac{3}{16}=\frac{1}{30}$, $\frac{3}{16}-\frac{1}{30}=\frac{90-16}{480}=\frac{74}{480}=\frac{37}{240}$;

$\frac{3}{16}$: $\frac{37}{240}$:: \$1200 : *Ans.*

$\frac{3}{16})\frac{37}{240}=\frac{37}{240}\times\frac{16}{3}=\frac{37}{45}$: then, $\$1200\times\frac{37}{45}=\$986,66+$

(35)

$\frac{2}{3}$ of $\frac{4}{5}$ of $\frac{3}{2}=\frac{4}{5}$, $\frac{4}{5})1=1\times\frac{5}{4}=\frac{5}{4}=1\frac{1}{4}$.

(36)

.003)2637.000

Ans. 879000

(37)

$8\frac{1}{2}=\frac{17}{2}$

$\frac{17}{2})144=144\times\frac{2}{17}=\frac{288}{17}=16\frac{16}{17}$ *inches.*

(38)

70*bu.* at \$0,92 = \$64,40

40*bu.* at \$1,37$\frac{1}{2}$ = \$55,00

Difference - - \$9,40

.40)\$9,4|0

$23\frac{1}{2}$*bu.*

(39)

Divide \$132 into 11 parts: the quotient is \$12. The saddle is worth 1 of these parts, and the horse 10: hence, the saddle is worth \$12, and the horse \$120.

(40)

A gains $\frac{1}{2}$ of \$4728=\$2364

B " $\frac{1}{4}$ of \$4728=\$1182

C " $\frac{1}{6}$ of \$4728=\$ 788

D " =\$4728−\$4334=\$394

(41)

$\frac{1}{4}+\frac{1}{6}+\frac{1}{8}+\frac{1}{12}=\frac{15}{24}=\frac{5}{8}$;

$1-\frac{5}{8}=\frac{3}{8}$ the sheep in the 5th lot.

Hence, $\frac{3}{8}=450$; or, $\frac{1}{8}=150$; hence, the whole, or $\frac{8}{8}=1200$.

(42)

360
$69\frac{1}{2}$
324
216
18
2|0)2502|0
$365\frac{1}{4}$)1251 *days*(3
$1095\frac{3}{4}$
Ans. 3*yr.* $155\frac{1}{4}$ *days.*

(43)

1st yard.
$100 \times 50 = 5000$ *Sq. ft.*
$144 \times 5000 = 720000$ *Sq. in.*
32)720000(22500

2d yard.
$50 \times 50 = 2500$ *Sq. ft.*
$144 \times 2500 = 360000$ *Sq. in.*
32)360000(11250.

(44)

1142
45
5710
4568
16.5)51390.0(3114 *rods*+.
495
189
165
240
165
750
660
90
4|0)311|4
8)77 . . 34
9 . . 5
Ans. 9*mi.* 5*fur.* 34*rd.*+.

(45)

If they travel in the same direction, they separate at the rate of 4 miles a day: if in opposite directions, at the rate of $32+36=68$ miles.

$19 \times 4 = 76$ for the same direction.
$68 \times 19 = 1292$ opposite directions.

(46)

$\frac{1}{2}+\frac{1}{4}+\frac{1}{6}=\frac{11}{12}$, consequently $\frac{1}{12}$ remains, which is equal to $120+80=200$. Hence,

$200\times 12=2400$ *Ans.*

(47)

The time past midnight is equal to the time past noon plus 12 hours. The time from midnight to noon, 12 hours, is four-fifths of the whole time. Hence, the time past noon, being one-fifth $=12\div 4=3hr.$

Ans. 3 *o'clock.*

(48)

	3.1416	$865^2=$	748225
	865		.7854
	157080		2992900
	188496		3741125
	251328		5985800
circum.	2717.4840*ft.*		5237575
		area	587655.9150*Sq. ft.*

(49)

2*ft.* long		12*yd.*$=36$ feet	
1 wide			6 high
2			216
$\frac{1}{2}$ thick			4
1 solid *ft.*			1)864
			864

(50)

	.7854		.7854
6.5*ft.* squared is	42.25	3.5*ft.* squared is	12.25
outer area	33.183150	inner area	9.621150

$33.183150-9.621150=23.562$

height 40

942.480

(51)

The first fills $\frac{1}{40}$ of the reservoir in 1 minute.

The second $\frac{1}{50}$ in 1 minute.

$$\frac{1}{40}+\frac{1}{50}=\frac{50+40}{2000}=\frac{90}{2000}=\frac{9}{200};$$

So that both cocks would fill $\frac{9}{200}$ of it in 1 minute. But it leaks $\frac{1}{25}$ per minute; hence, $\frac{9}{200}-\frac{1}{25}$ = what is filled.

$$\frac{9}{200}-\frac{1}{25}=\frac{9-8}{200}=\frac{1}{200};$$

$\frac{1}{200}$: 1 :: 1*m.* : 200*m.*

Ans. 3*hr.* 20*m.*

(52)

	ft.			
	4	6′		
	2	9′		
	9	0′		
	3	4′	6″	
	12	4′	6″	
	5	4′		
	61	10′	6″	
	4	1′	6″	0″
Ans.	66	0′	0″	

(54)

The mother was to have twice as much as the daughter, and half as much as the son.

Hence, if we suppose the estate divided into 7 equal parts, the daughter has 1, the mother 2, and the son 4.

7)5460($780 daughter's

2

$1560 mother's

2

$3120 son's.

(55)

The 1st will empty in $1m.$ - - - - - $\frac{1}{60}$ of it.
2d " " " - - - - - $\frac{1}{120}$ "
3d " " " - - - - - $\frac{1}{180}$ "
together, $\frac{1}{60}+\frac{1}{120}+\frac{1}{180}$ equals $\frac{6}{360}+\frac{3}{360}+\frac{2}{360}=\frac{11}{360}$.
$\frac{11}{360}$: 1 :: $1m.$: $\frac{360}{11}=32\frac{8}{11}m.$

(57)

$2)50=25$; $\overline{25}^2=625$
$\overline{12}^2=144$
769

$\sqrt{769}=27.7ft.+.$

(60)

$85° \times 4=340m.=5hr.\ 40m.$
$20' \times 4=80sec.=\ 1\ 20sec.$
Ans. $5hr.\ 41m.\ 20sec.$

(61)

Now the traveller from New Haven travels 8 hours at 3 miles the hour before the other starts: hence, he has advanced $8\times3=24$ miles. At 4 in the afternoon they are $130-24=106$ miles apart. Now, they approach each other at the rate of 7 miles an hour: they therefore meet in $\frac{106}{7}=15\frac{1}{7}$ hours.

The first has travelled 24 miles.
Also, ... $15\frac{1}{7}\times3=$ $45\frac{3}{7}$
Total $69\frac{3}{7}$ *miles.*

(62)

It is evident that the officer gains on the thief at rate of 2 miles per hour. As the thief has 40 mil start, he must gain 40 miles, which will take 2 hence he travels $20\times7=140$ miles.

(63)

A does in 1 day $\frac{1}{10}$ of the work.
B " " 1 day $\frac{1}{13}$ " " "
together they do $\frac{1}{10}+\frac{1}{13}$ of the work.

$\frac{1}{10}+\frac{1}{13}=\frac{13+10}{130}=\frac{23}{130}$, $\frac{23}{130}$: 1 : : 1 day : $5\frac{15}{23}da.$

(64)

$\frac{1}{16}+\frac{3}{8}+\frac{3}{10}+\frac{3}{20}$ will be equal to all the school except the 9 who read. Of the denominators of these fractions 80 is the least common multiple: hence,

$$\frac{5}{80}+\frac{30}{80}+\frac{24}{80}+\frac{12}{80}=\frac{71}{80};\text{ and } 1-\frac{71}{80}=\frac{9}{80}$$

the residue of the school, which is equal to 9: then if $\frac{9}{80}$ of a school is equal to 9, how many in the school? of course 80.

$\frac{1}{16}$ of $80=5$; $\frac{3}{8}$ of $80=30$; $\frac{3}{10}$ of $80=24$;
$\frac{3}{20}$ of $80=12$.

(65)

A . . 3	15	:	3	: :	120	: $24 A's share.
B . . 5	15	:	5	: :	120	: $40 B's share.
C . . 7	15	:	7	: :	120	: $56 C's share.
15						

THE END.



$$
\begin{array}{r}
\overset{1}{\cancel{2}}\overset{6}{\cancel{3}} \\
2.10.00 \\
34.00 \\
\hline
136.00 \\
10.00 \\
\hline
146.00 \\
20 \\
\hline
166.00 \\
10 \\
\hline
176.00
\end{array}
\qquad
\begin{array}{r}
16 \\
3 \\
\hline
34
\end{array}
$$

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